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LMSD-6134

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WS 117L

SENTRY SYLLABUS

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

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LMSD-6134

12 AUGUST 1958

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WS 117L

SENTRY SYLLABUS

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

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FOREWORD

The chart and photograph reproductions which comprise this report are pertinent to a presentation made to Mr. Roy W. Johnson, Director, Advanced Research Projects Agency, and members of his staff. Essentially, the presentation was given in two parts.

> Part I .... a detailed technical briefing on the Sentry Weapon System 117L as currently programmed or proposed, and
>
> Part II ... a discussion of advanced component requirements and possible system applications to other programs.

Information pertinent to the system is presented herein. The presentation was given at the Pentagon on 14 and 15 August 1958.

AF/L/ARPA BRIEFING
14-15 August 1958
Pentagon, Room 3E144

Thursday 14 August

0900	Introduction - Mission Concept	Lt. Col. Lee Battle
0910	Sentry System Program	J. H. Carter
0925	System Development Plan	F. W. O'Green
0940	Present Status	
	Support Systems	R. D. King
	Facilities and GSE	
	Recovery	
	Operations Control Plan	
1020	Break .	
1040	Subsystems	
	Airframe	F. W. O'Green
	Propulsion	
	Guidance and Control	
	Power	C. W. Burrell
1200	Lunch	
1300	Visual	F W. O'Green
	Biomedical	
	Ferret	P. D. Doersam
	Infrared	J. J. Knopow
	Communications	J. G. Schaub
	Data Control	
1430	Break	
1450	Film: Progress Report No. 7	
1510	Questions	
1600	Brochure	
1615	Conclude	

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117L/ARPA BRIEFING
14-15 August 1958
Pentagon, Room 3E144

Friday 15 August

0900	Advanced Components	
	Power	C. W. Burrell
0930	TV Sensing	Peter C. Goldmark
1000	Ferret	P. D. Doersam
1015	Infrared Detection & Tracking	J J. Knopow
1035	Break	
1055	Data Storage	J. P. Nash
1125	Propulsion	J. E. Laurance
1200	Lunch	
1300	Other Applications of the Sentry System	
	General Satellite Tracking Communications	J. Jenkins
1330	Weather	E. V. Stearns
1345	Scientific Measurements	F. S. Johnson
1400	Break	
1420	MIS	J. W. Brandon
1440	ICBM	S. H. Browne
1500	Summary	J. H. Carter
1520	Conclude	

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P14(4)	Advanced Reconnaissance System Evolution
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P250(3)	WS117L Program Objectives
P257(5)	WS117L Development Program
P102(5)	Sentry Facilities
P800	Sentry Payload - Defined
P238(3)	The Sentry Subsystems
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P566	WS117L Airframe and Propulsion
P567	WS117L Payload
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P791	Altitude vs. Payload - Sentry/Atlas
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P335(1)	WS117L System APU Life Limitations
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PHOTOGRAPH REPRODUCTIONS:

Photo No.	
P3017	Flight Test Vehicles Nos. 1 and 2 in Mod & Checkout - LMSD Palo Alto
P3018	Flight Test Vehicles Nos. 1 and 2 in Mod & Checkout - LMSD Palo Alto

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P3022	Flight Test Vehicle No. 2 in Mod & Checkout - LMSD Palo Alto
P3021	Flight Test Vehicle No. 2 in Mod & Checkout - LMSD Palo Alto
P3039	Model XLR Engines - JP4 and UDMH
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P3046	Systems Checkout Complex (excluding LACE U ..)
P3047	LACE Unit (Systems Checkout Complex)

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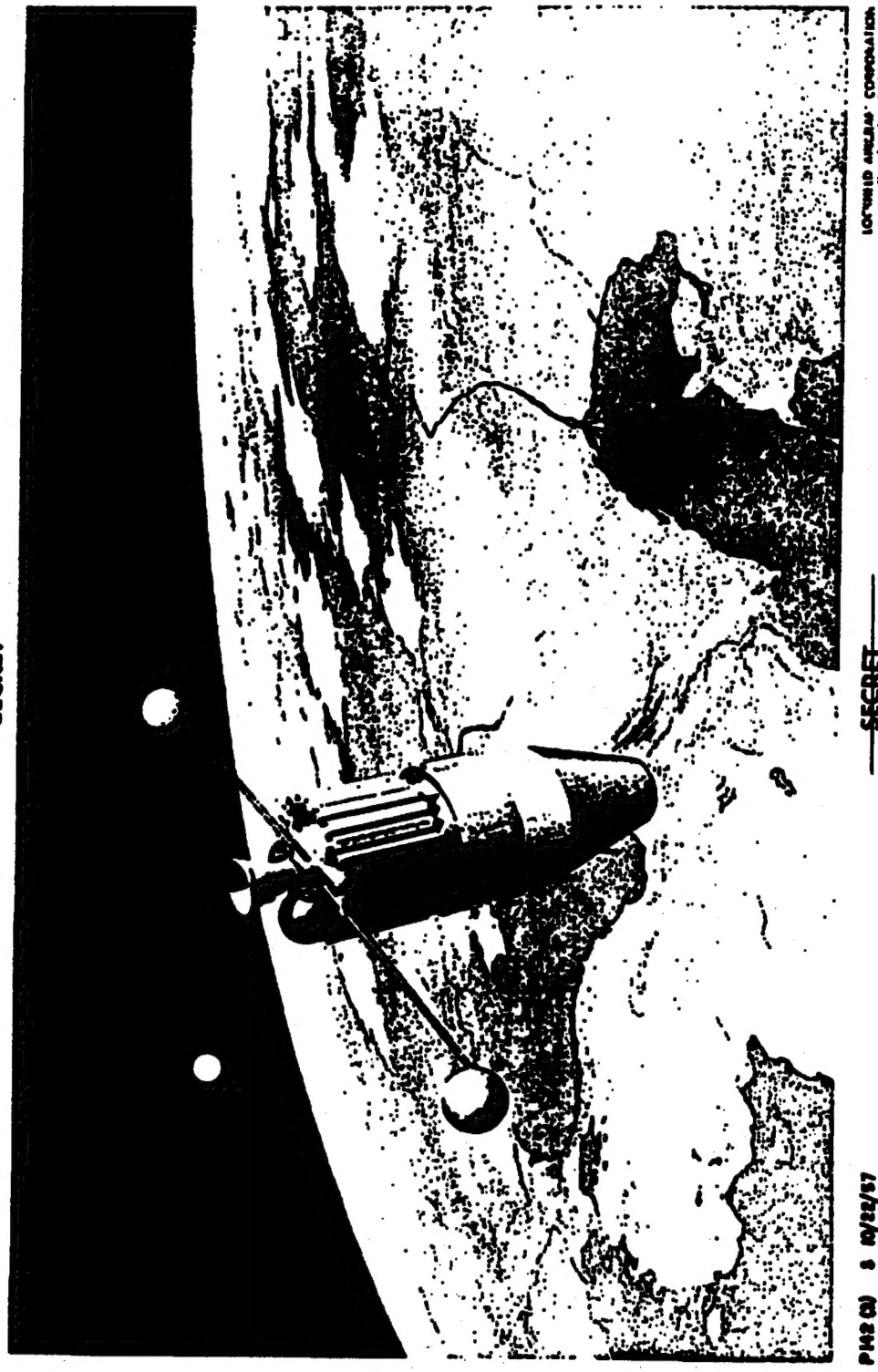
ADVANCED RECONNAISSANCE VEHICLE



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ADVANCED RECONNAISSANCE SYSTEM EVOLUTION

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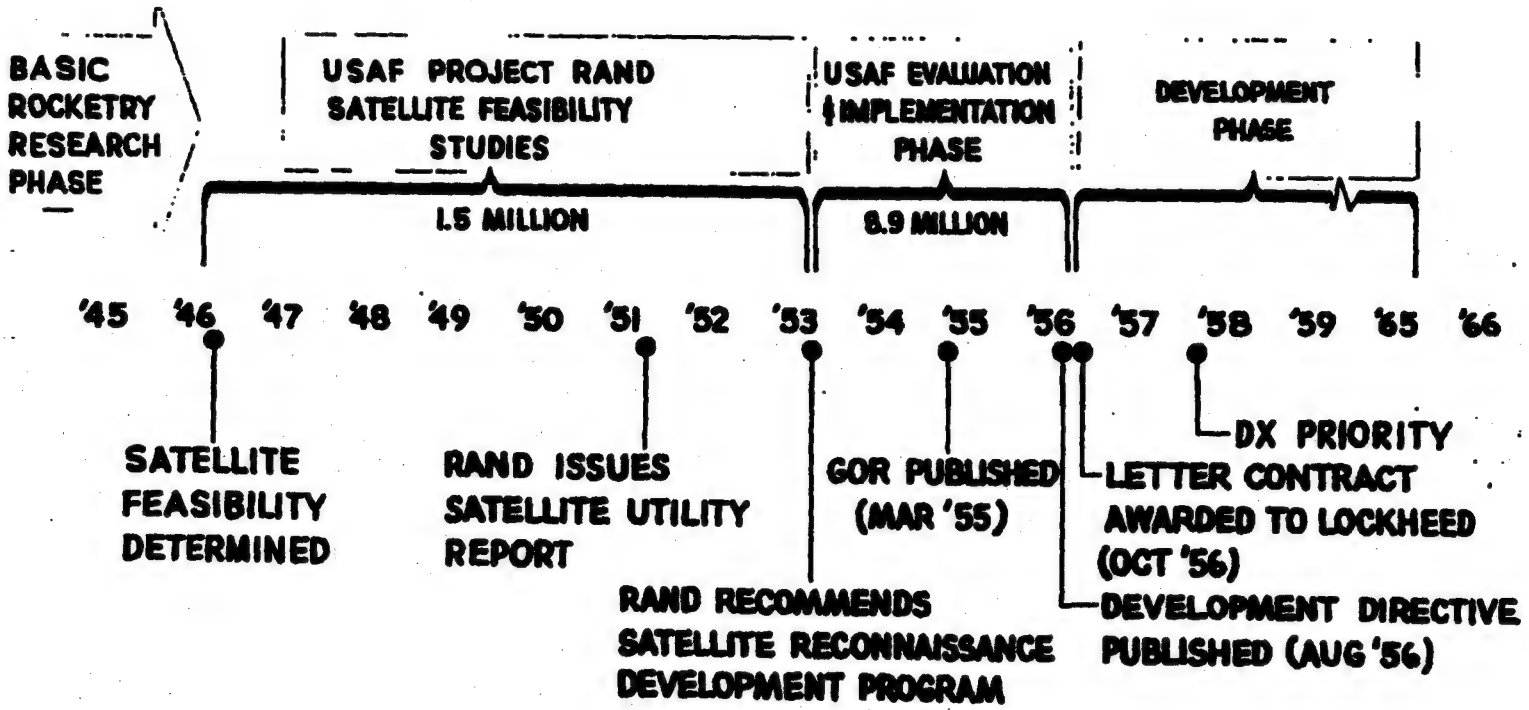

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SENTRY OPERATIONAL OBJECTIVES

VISUAL RECONNAISSANCE

- MAPPING OF USSR AND SATELLITES
- * STRATEGIC WARNING INDICATIONS
  - -WEAPONS AND BASES IN BEING
  - -MILITARY LOGISTICS
  - -INDUSTRIAL WAR CAPABILITIES
- NUCLEAR DETONATION DETECTION
- WEATHER OBSERVATION

* OPEN SKY NATIONAL OBJECTIVES

ELECTRONIC RECONNISSANCE

* DETECT & OBTAIN INFORMATION ON ELECTRONIC EMITTERS IN AREAS OF USSR & SATELLITES NOT NOW AVAILABLE

INFRARED RECONNAISSANCE

* ICBM ATTACK WARNING

COMMUNICATIONS

* SATELLITE LINKS FOR SECURE & RAPID GLOBAL COMMUNICATIONS

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WS 117L PROGRAM OBJECTIVES

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PROGRAM TITLE	MAJOR DEVELOPMENT OBJECTIVES
I. ENGINEERING PROTOTYPE DEVELOPMENT & TESTS	PLACE STABILIZED SATELLITES ON ORBIT AT 300 S.M. ALTITUDE TEST RECONNAISSANCE PAYLOAD AND GENERAL SYSTEM OPERATIONS
II. PIONEER VISUAL RECONNAISSANCE	PROVIDE SMALL SCALE PHOTOGRAPHIC COVERAGE OF USSR SATELLITE-BORNE FILM PROCESSING; VIDEO TRANSMISSION OF PHOTO IMAGES 100 X 1500 MILE PHOTO STRIP PER PASS AVERAGE 100 FT. RESOLUTION 1 MILE TARGET LOCATION ACCURACY
IIA. EARLY ACHIEVEMENT OF ORBITAL CAPABILITY TEST CAPSULE RECOVERY SYSTEM	PLACE SATELLITES ON POLAR ORBIT. INCORPORATE RECOVERABLE CAPSULE IN SELECTED SATELLITES FOR BIOMEDICAL RESEARCH PURPOSES.
III. PIONEER FERRET RECONNAISSANCE	INTERCEPT USSR ELECTROMAGNETIC EMISSIONS IN THE 50-10,000 MCS SPECTRUM RECEIVE AND MEASURE BASIC SIGNAL PARAMETERS; 50-100 MILE LOCATION ACCURACY SORT KNOWN SIGNALS FROM UNKNOWN SIGNALS PROVIDE GUIDANCE FOR DESIGN OF ADVANCED FERRET EQUIPMENTS
IV. ADVANCED VISUAL RECONNAISSANCE	PROVIDE HIGH RESOLUTION PHOTOGRAPHS OF SPECIFIC GROUND TARGETS 17 MILE SWATH WIDTH 20 FT. RESOLUTION 1/2 MILE TARGET LOCATION ACCURACY
V. ADVANCED FERRET RECONNAISSANCE	MORE ACCURATELY DETERMINE PARAMETERS OF ELECTRONIC SIGNALS FREQUENCY RANGE: 50-40,000 MCS
VI. VISUAL SURVEILLANCE	SIMILAR TO PROGRAM IV, BUT USING: LONG DURATION POWER SUPPLY MULTIPLE VEHICLES HIGHER RESOLUTION HIGH SPEED GROUND TRANSMISSION OF DATA POSSIBLY SUBSTITUTE TV WITH TAPE RECORDING FOR FILM
VII. INFRARED SURVEILLANCE	PROVIDE SATELLITE SYSTEM TO FURNISH INSTANTANEOUS WARNING OF AN ICBM ATTACK LATER SATELLITE SYSTEM TO PROVIDE PRECISION AICBM DETECTION-PREDICTION DATA
VIII. FERRET SURVEILLANCE	SIMILAR TO PROGRAM V, BUT USING: MULTIPLE FUNCTIONS AND FLEXIBILITY EMPLOYS MULTIPLE VEHICLES LONG DURATION POWER SUPPLY IMMINENCE OF HOSTILITIES WARNING

P-250 (S) 8 2/17/58
WD-58-00776

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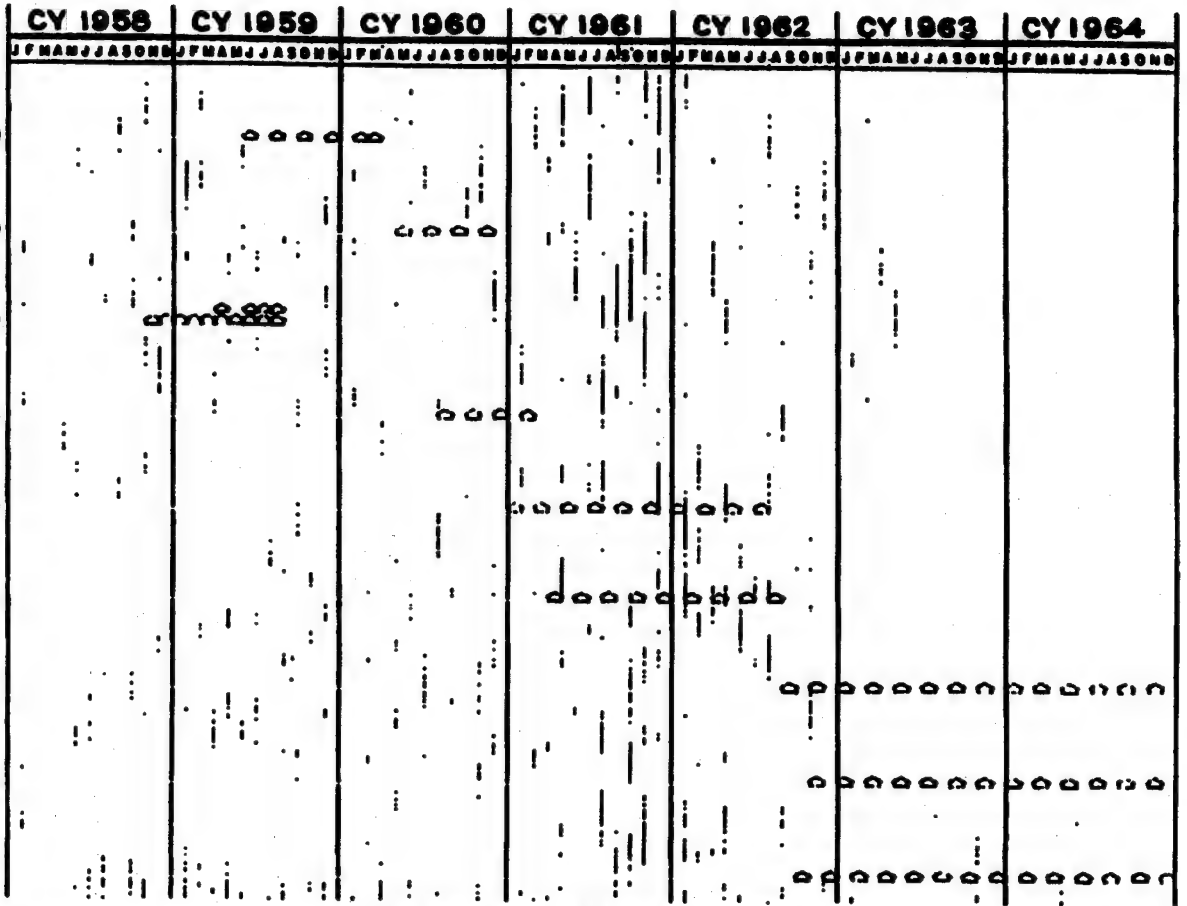
WS117L DEVELOPMENT PROGRAM

SECRET

* FLIGHT TEST SCHEDULE



P257 (5)-7/23/58
WD-58-02843

* WS117L STATEMENT OF WORK, AFBMO, 16 APRIL 1958
AS AMENDED 7JULY 1958

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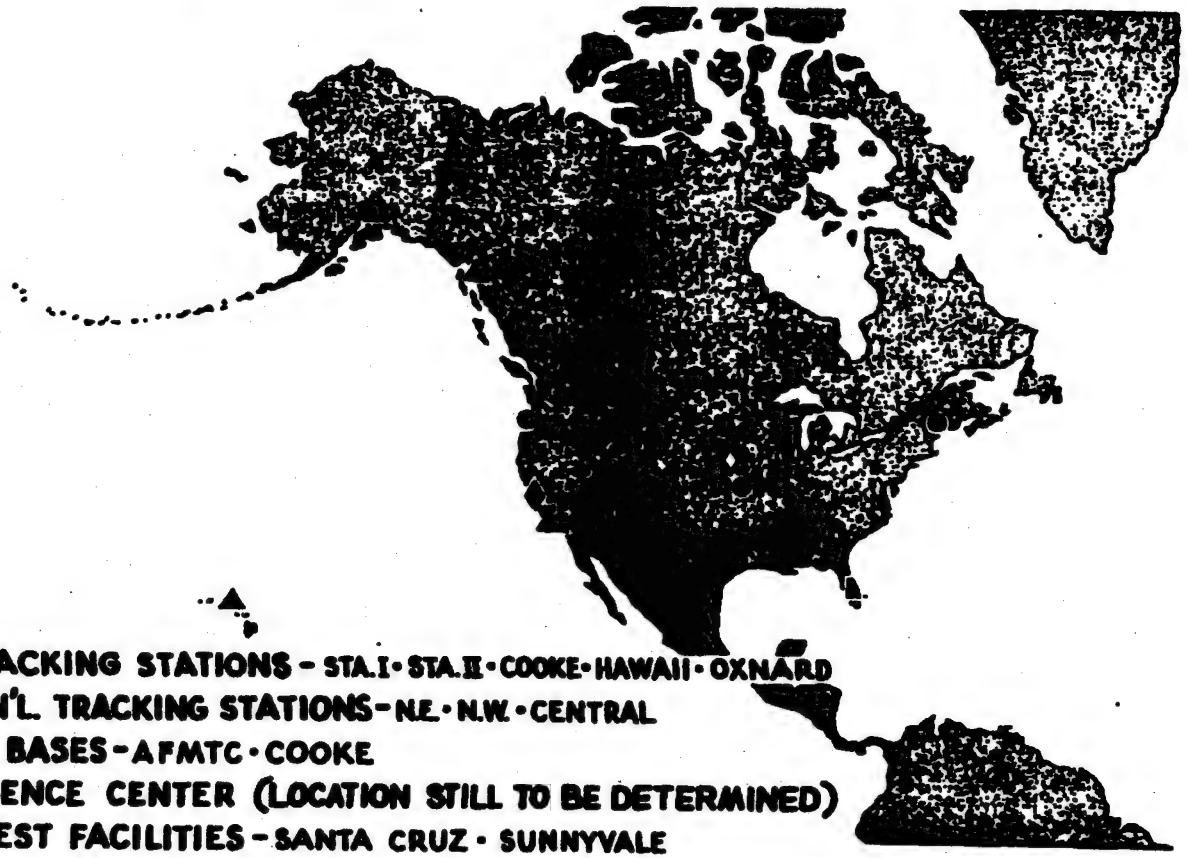
SENTRY FACILITIES



LEGEND

▲ TEST TRACKING STATIONS - STA.I • STA.II • COOKE • HAWAII • OXNARD

● DEV./OPN'L. TRACKING STATIONS - N.E. • N.W. • CENTRAL

LAUNCH BASES - AFMTC • COOKE

◇ INTELLIGENCE CENTER (LOCATION STILL TO BE DETERMINED)

◆ LMSD TEST FACILITIES - SANTA CRUZ • SUNNYVALE

P102 (5) SO 5/2/58
WD-58-02843

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SENTRY PAYLOAD - DEFINED

RECONNAISSANCE MISSIONS:

- ALL SENSING, PROCESSING & STORAGE EQUIPMENT
- ALL RELATED AUXILIARY POWER SYSTEM EQUIPMENT
- ALL RELATED COMMUNICATIONS EQUIPMENT

BIOASTRONAUTIC RECOVERY MISSIONS:

- RECOVERY CAPSULE & ROCKET
- CAPSULE CARGO

LOCKHEED AIRCRAFT CORPORATION SECRET MISSILE SYSTEMS DIVISION

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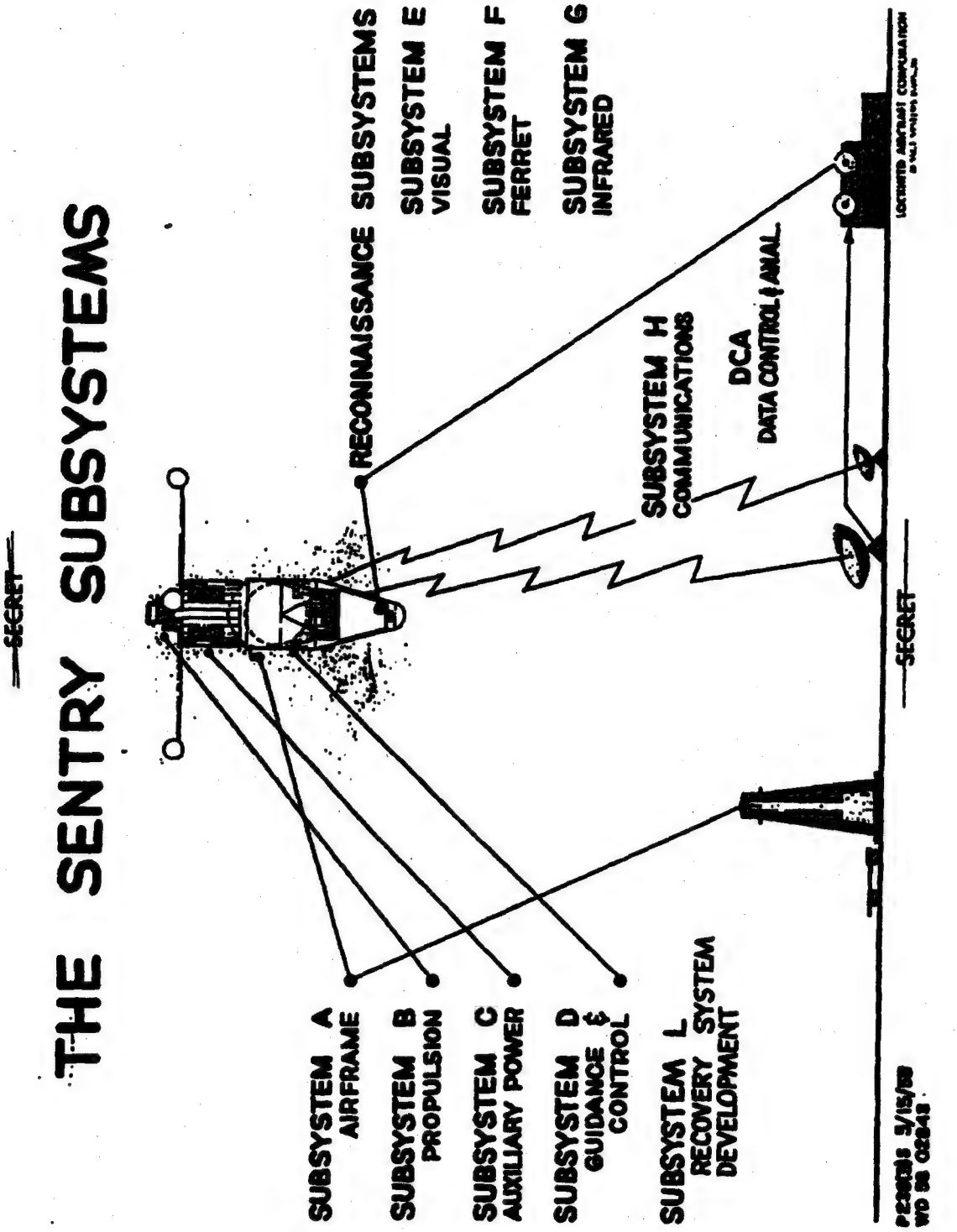

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WS117L R&D ORGANIZATION

LOCKHEED AIRCRAFT CORP. MISSILE SYSTEMS DIVISION

WEAPON SYSTEM CONTRACTOR

RESEARCH & ANALYSIS
ANTENNA DEVELOPMENT
TELEMETRY
AIRFRAME FABRICATION
CHECKOUT & ASSEMBLY
STATIC & FLIGHT TESTS

PRINCIPAL SUBCONTRACTORS

PROPULSION
- BELL AIRCRAFT CORP.
- AEROJET-GENERAL CORP.

AUXILIARY POWER
- SONOTONE CORP.
- EAGLE-PICHER CO.
- ENGINEERED MAGNETICS
- HOFFMAN ELECTRONICS CORP.
- BEECHCRAFT R&D INC.

GUIDANCE & CONTROL
- DETROIT CONTROLS CORP.
  REEVES INSTRUMENT CORP.
- MINNEAPOLIS-HONEYWELL REGULATOR CO.
- BENDIX AVIATION CORP.

VISUAL RECONN.
- EASTMAN KODAK CO.
  COLUMBIA BROADCASTING SYS.
  SPICA INC.
- AMPEX CORP.

FERRET
- AIRBORNE INSTRUMENTS LAB. INC.
- HALLER, RAYMOND & BROWN INC.

INFRARED RECONN.
- EASTMAN KODAK CO.
- BAIRD ATOMIC CO.
- AEROJET-GENERAL CORP.
- GENERAL MILLS INC.

GROUND-SPACE COMM.
- PHILCO CORP.
  REEVES INSTRUMENT CORP.
  RADIATION INC.
- LOCKHEED AIRCRAFT SERVICES INC.
- HUGHES AIRCRAFT CO.
- TEXAS INSTRUMENT CORP.

TEST MGMT & OPERATIONS
- AEROJET-GENERAL CORP.
- RALPH M. PARSONS CO.

GROUND SUPPORT EQUIP.
- OTIS ELEVATOR CO.
- CONSOLIDATED AVIONICS CORP.
- BEMCO, INC.
- STANDARD MFG. CO. INC.
- HUFFORD CORP.

BIO MEDICAL CAPSULE
- GENERAL ELECTRIC CO.
- ALL AMERICAN ENGINEERING CO.

ASSOCIATE CONTRACTORS

BOOSTERS
- DOUGLAS A/C CORP. (SM-75)
- CONVAIR ASTRONAUTICS (SM-65)

GUIDANCE & CONTROL
- INSTRUMENTATION LAB., MIT
- GENERAL ELECTRIC CO.

AUXILIARY POWER
- THE MARTIN CO.
- ATOMICS INTERNATIONAL

DATA PROCESSING
- RAMO-WOOLDRIDGE CORP.

P283 (5) "S" 8/4/58
WD-58-02843

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WS 117L AIRFRAME & PROPULSION

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WS117L PAYLOAD

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SUBSYSTEM "E"

SUBSYSTEM "F"

SUBSYSTEM "G"

SECRET

P567 S 6/3/58
WD-58-03455

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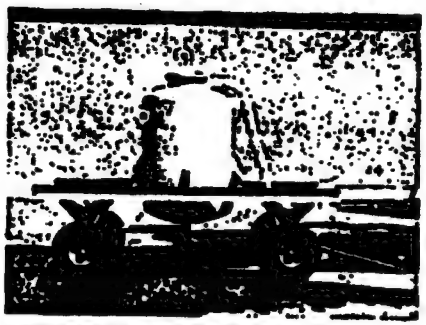
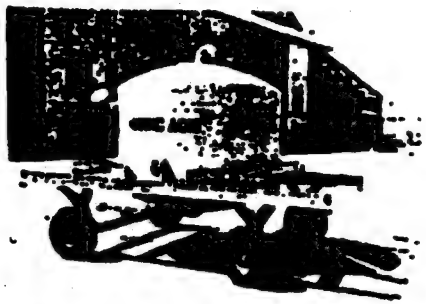
WSMZL GROUND SUPPORT EQUIPMENT

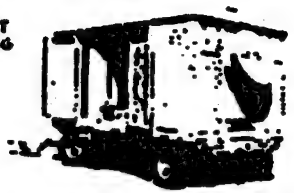


FUEL DUMP TRAILER

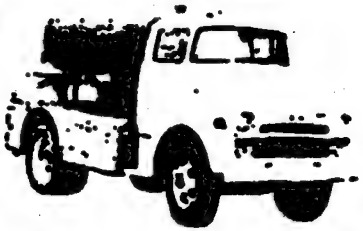


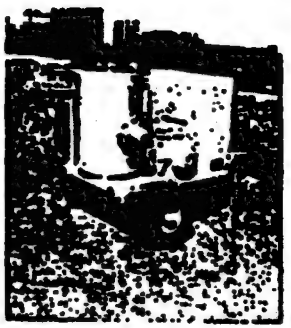
ACID DUMP TRAILER

ENGINE THRUST CHAMBER FLUSHING

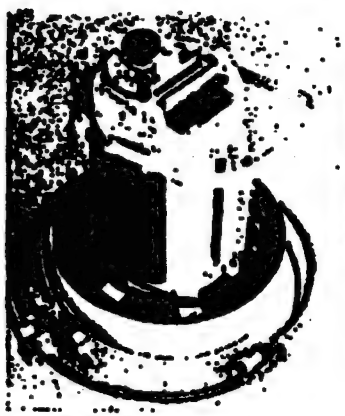


FUEL TRUCK

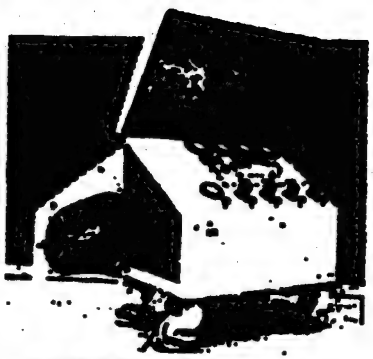




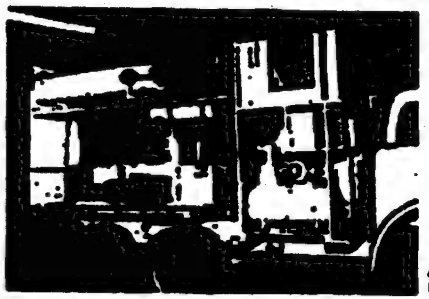
ENGINE FLUSHING TRAILER



UDMH LOADER



PROPULSION CHECKOUT CONSOLE MODIFIED BELL UNIT



ACID TRAILER AND FLUSHING TRUCK

P.568 GSE 6/3/58
WD-58-03455

LOCKHEED AIRCRAFT CORPORATION

MISSILE SYSTEMS DIVISION

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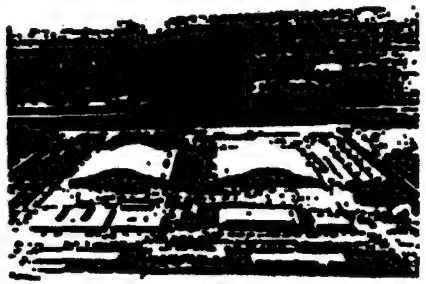
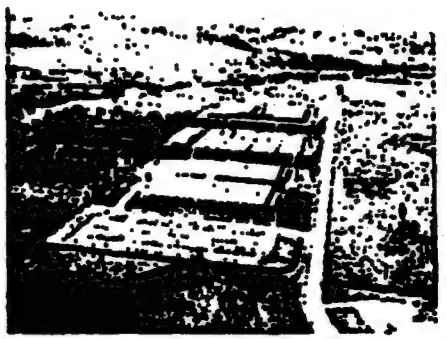
MISSILE SYSTEMS DIVISION

LOCKHEED FACILITIES FOR WS 117L



VAN NUYS
AIRFRAME FABRICATION

SUNNYVALE
COMPONENT ASSEMBLY

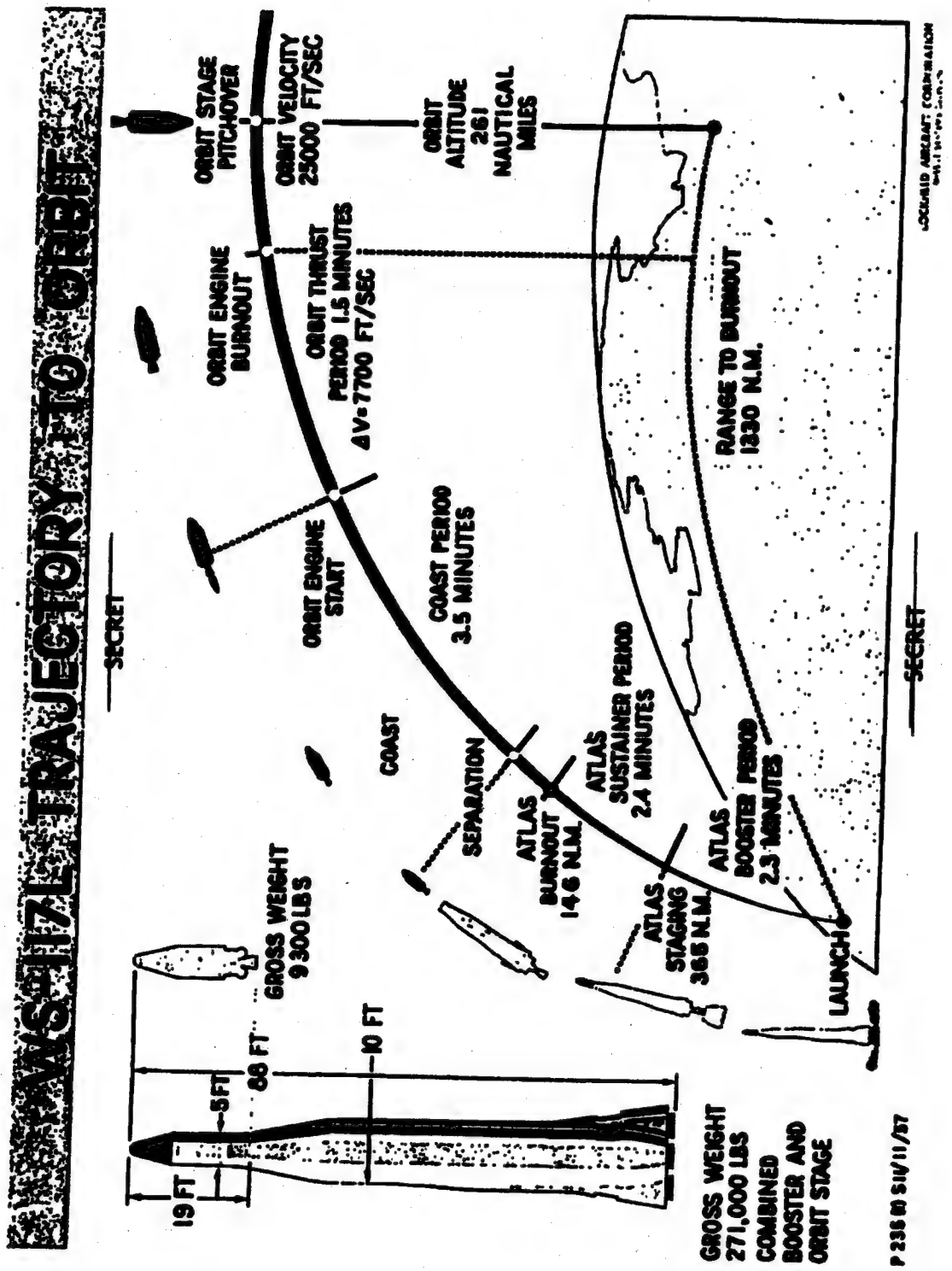


PALO ALTO
PROJECT MGMT. SYSTEM DESIGN
VEHICLE MOD. & CHECKOUT

SANTA CRUZ
HAZARDOUS TEST FACILITY

NOTE: BURBANK C-1 — COMPONENT MFG. & TEST

P565 SO 6/3/58
WD-58 03455



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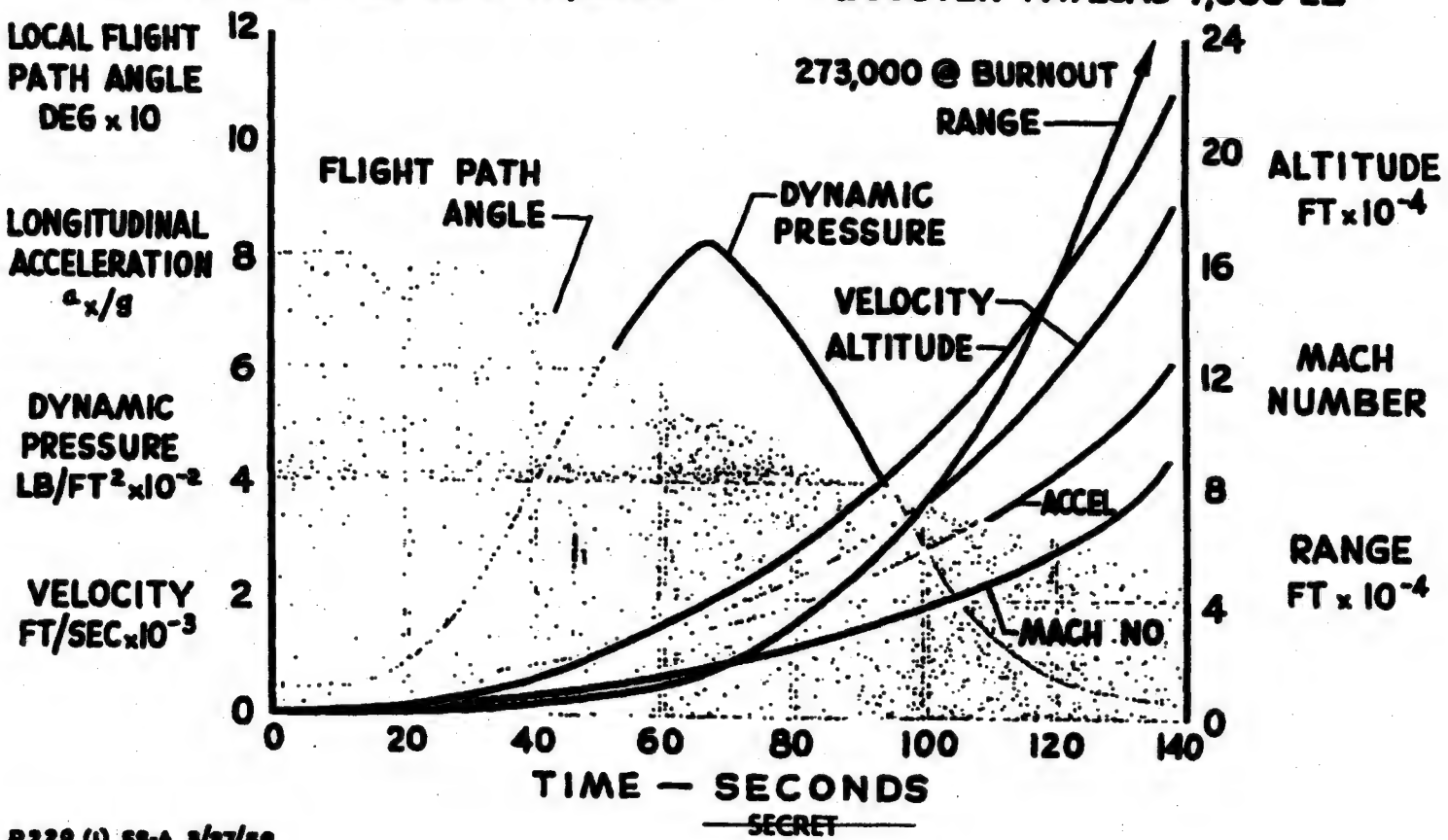
WS117L ORBITAL TEST VEHICLE DESIGN PARAMETERS

SECRET

BOOSTER STAGE

GROSS WT @ LAUNCH 271,163 LB

BOOSTER PAYLOAD 9,300 LB



SECRET

P229 (1) 59-A 3/27/58
WD-58-01588

LOCKHEED AIRCRAFT CORPORATION — SECRET — MISSILE SYSTEMS DIVISION

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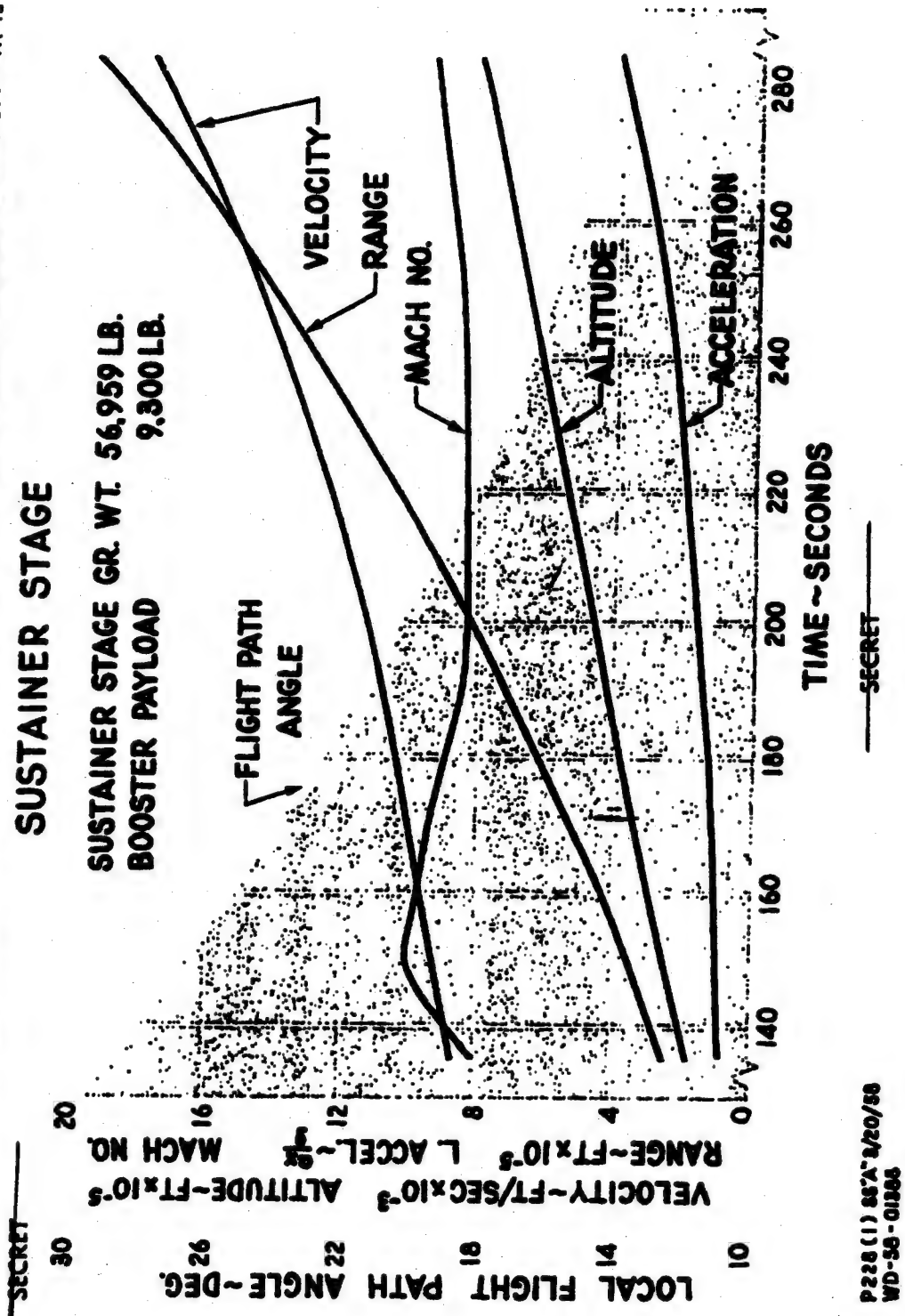
SECRET

WS117L ORBITAL TEST VEHICLE DESIGN PARAMETERS



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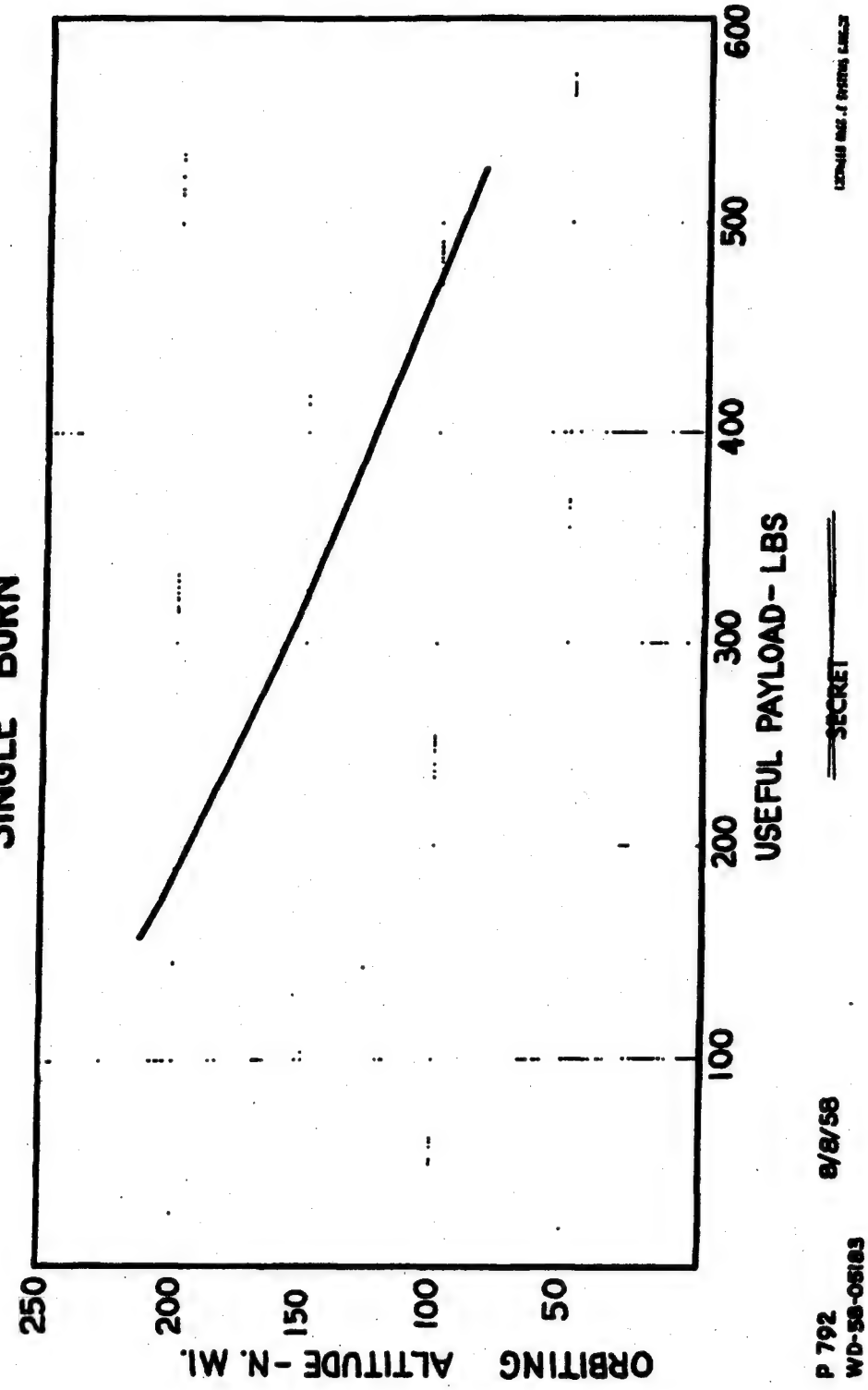
ALTITUDE VS. PAYLOAD-SENTRY/ THOR



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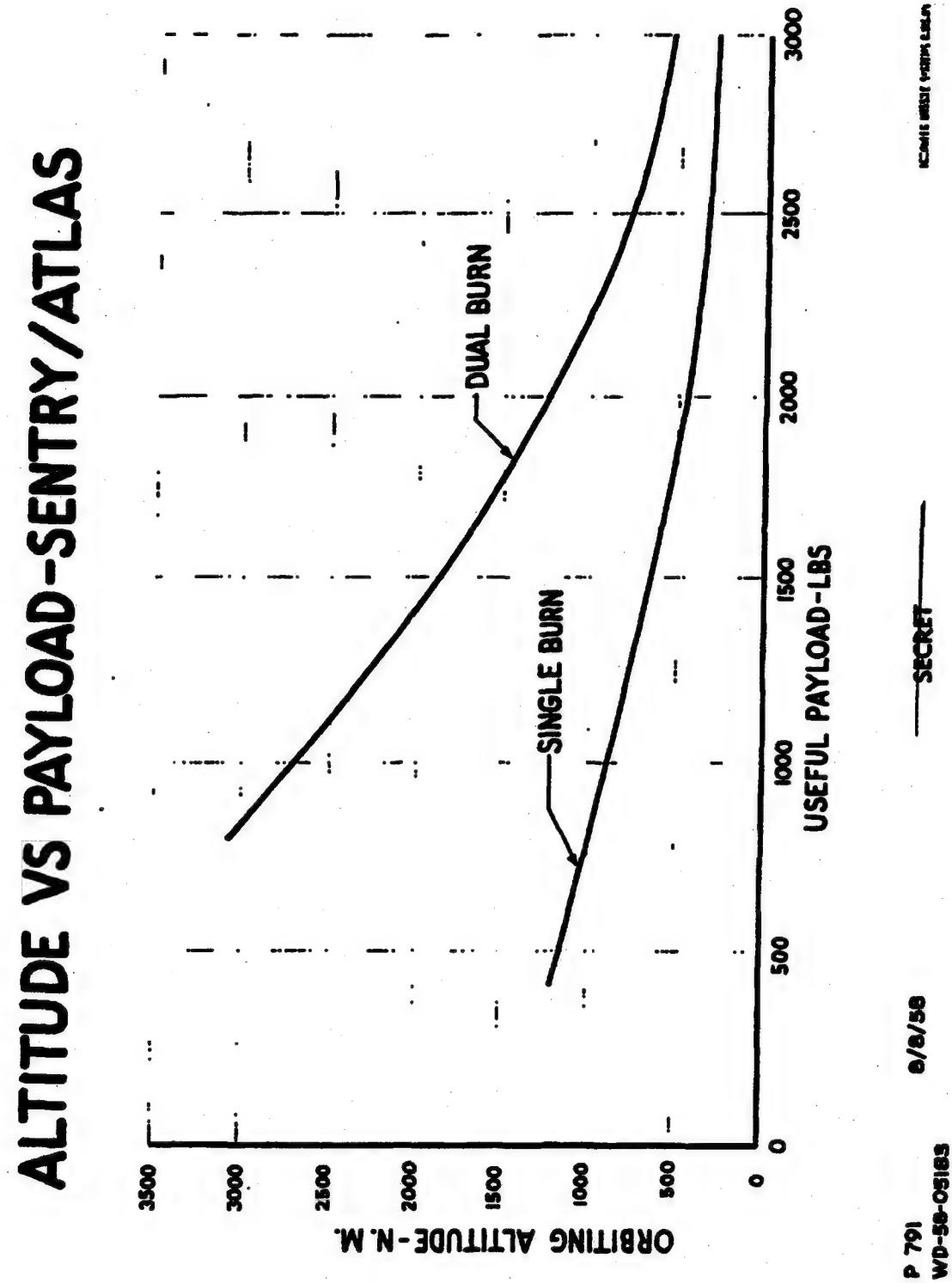

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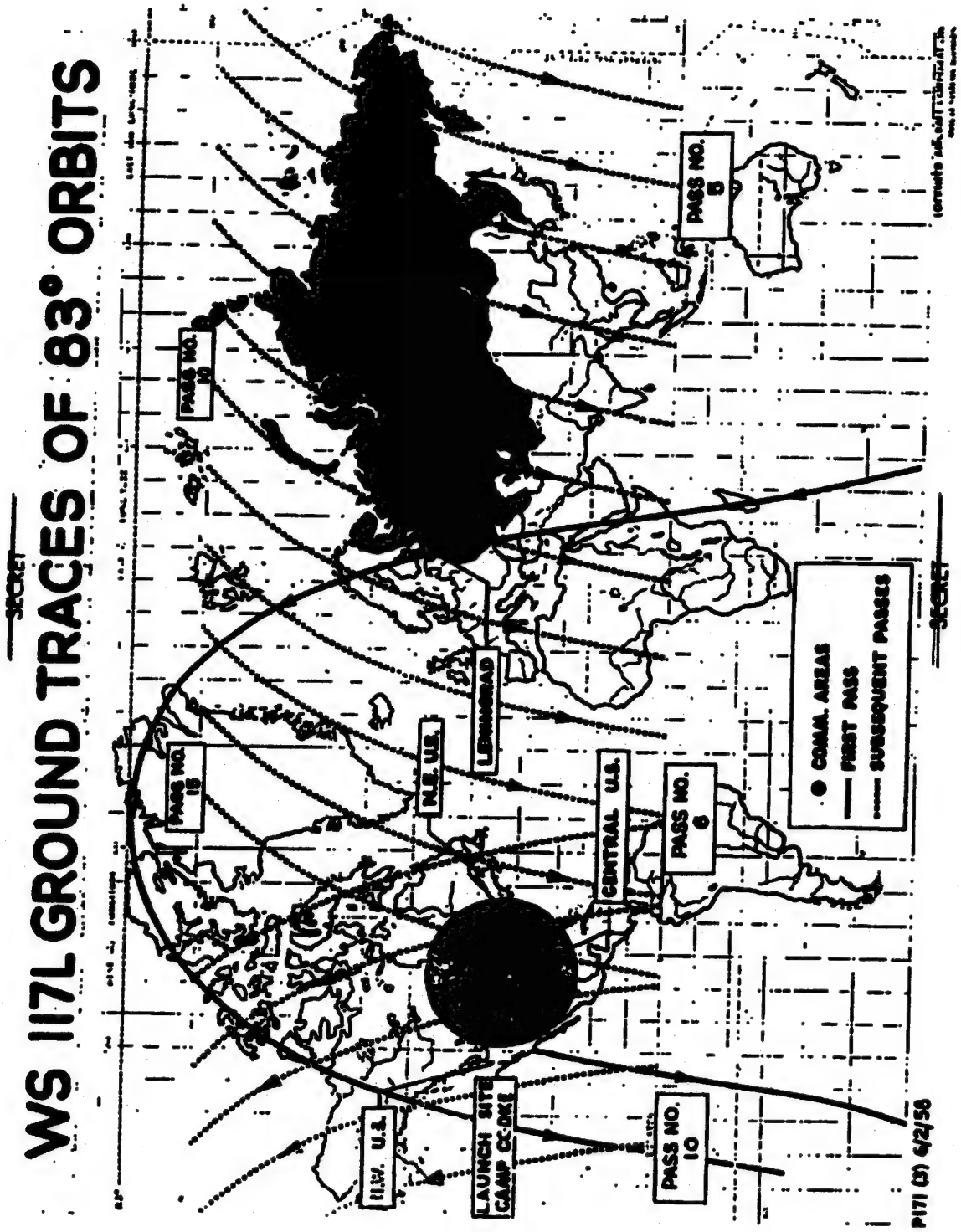

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LOCKHEED AIRCRAFT CORPORATION —SECRET— MISSILE SYSTEMS DIVISION

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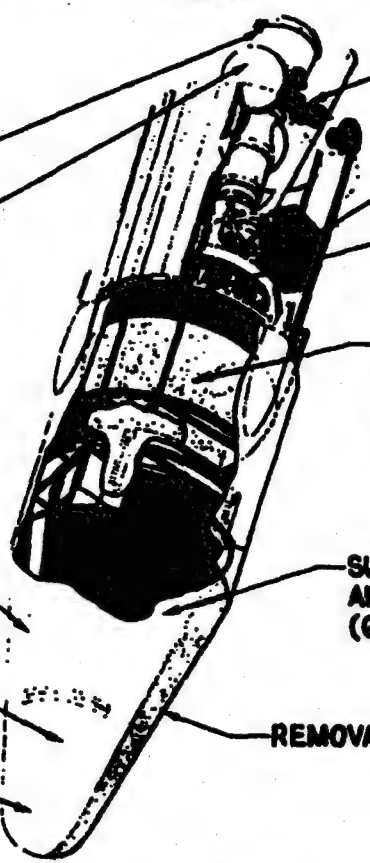
[redacted] VEHICLE

VISUAL RECONNAISSANCE MODEL

SECRET



ENGINE GIMBAL LIMITS 5°
SQUARE PATTERN
ENGINE-BELL AIRCRAFT
THRUST 15,000 LB ALT.
I_{sp} 263 SEC.
NOZZLE EXPANSION RATIO 15:1

N_2 GAS STORAGE FLASK
3000 PSI

VISUAL RECONNAISSANCE SYSTEM
CAMERA PACKAGE (EKC)
PHOTO, PROCESS, STORAGE,
ELECTRONIC READOUT

CAMERA LENS SHIELD

NOSE (JETTISONS)

ATTITUDE ROLL AND
REORIENTATION CONTROL
GAS JETS (6)

AUXILIARY POWER
SOURCE (BATTERIES)

FUEL TANK
JP-4 60 PSI

OXIDIZER
TANK (IRFNA)
60 PSI

He GAS STORAGE FLASK (2)
PROPELLANT TANK
PRESSURIZATION 3000 PSI

SUBSYSTEM ELECTRONICS COMPARTMENT
AND CAMERA SUPPORT STRUCTURE
(GUIDANCE, CONTROL, ETC.)

REMOVABLE NOSE FAIRING

P232 (2) SSA 5/20/58
WD-58-00776

SECRET

LOCKHEED AIRCRAFT CORPORATION

—SECRET—

WSH-17L STRUCTURAL BREAKDOWN

CONFIDENTIAL

CONFIDENTIAL

P466 (1) SSA' 6/13/58
WD-58-03455

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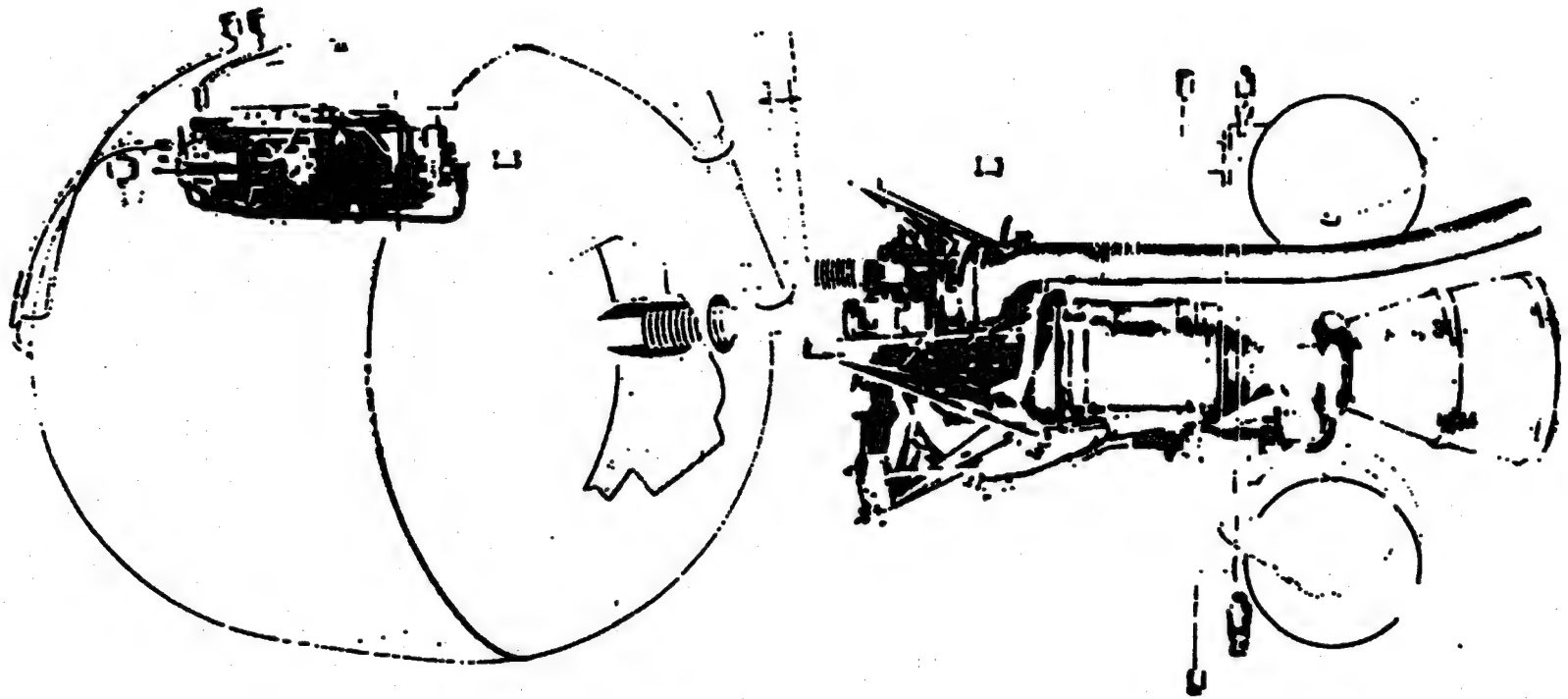
LOCKHEED AIRCRAFT CORPORATION

WS 117L PROPULSION SYSTEM



IRFNA

JP4

CONTROL JETS
NITROGEN SUPPY

ULLAGE ROCKETS

P422 (2) 55"B" 3/21/58
WD-58-01388

MISSILE SYSTEMS DIVISION

LOCKHEED AIRCRAFT CORPORATION —SECRET— MISSILE SYSTEMS DIVISION

SENTRY AUXILIARY POWER SUPPLY

DEVELOPMENT PROGRAM

	ENERGY YIELD	ADVANTAGES	DISADVANTAGES
● CONVENTIONAL PRIMARY BATTERIES SILVER PEROXIDE	75 WATT HRS/LB.	COMMERCIALLY AVAILABLE	LOW ENERGY YIELD
● HIGH ENERGY BATTERY HYDROGEN-OXYGEN	180 WATT HRS. PER LB.	HIGH ENERGY YIELD	NOT DEVELOPED
● SOLAR VOLTAIC CONVERTER SILICON BORON DIFFUSED p-n JUNCTION	200 WATT CONT. 800 LB.	OPERATES INDEFINITELY	REQ'S DEVELOPMENT TEMR CONTROL. METEORITE DAMAGE
● NUCLEAR THERMOMECHANICAL RADIOISOTOPE HEAT SOURCE	500 WATT 200 LB. + SHIELD LIFE 60 DAYS	LONG LIFE	HEAVY SHIELD REQUIRED
REACTOR HEAT SOURCE	3 KW 500 LB. + SHIELD LIFE 1 YEAR	LONG LIFE	HEAVY SHIELD REQUIRED

P 315 (2) 58 "C" 3/13/58

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LOCKHEED AIRCRAFT CORPORATION

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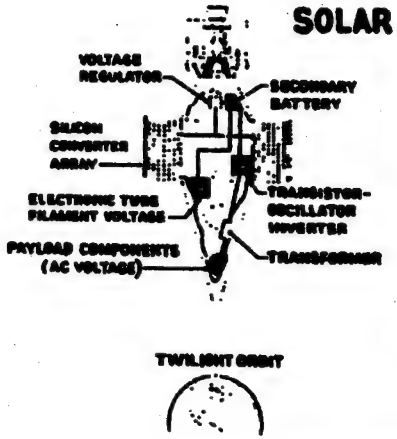
ADVANCED AUXILIARY POWER SYSTEMS

SECRET

SOLAR



CHARACTERISTICS

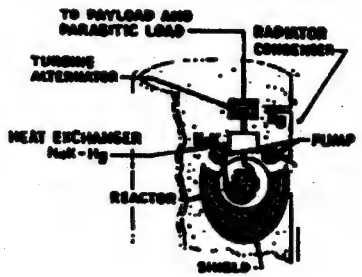
(a) ~10% CONVERSION EFFICIENCY (10-12 WATTS/FT²)

(b) NICKEL CADMIUM SECONDARY BATTERY OF 10 WATT-HRS/LB ~2500 CYCLE LIFE

(c) POWER SYSTEM LIFE LIMITED BY BATTERY AND/OR METEORIC EROSION

(d) TWILIGHT ORBIT ADVANTAGES: CONSTANT IRRADIATION AT NORMAL INCIDENCE, NO HELIOTROPE, COOLER CELLS (BACKSIDE RADIATION), HIGHER EFFICIENCY

NUCLEAR REACTOR



CHARACTERISTICS

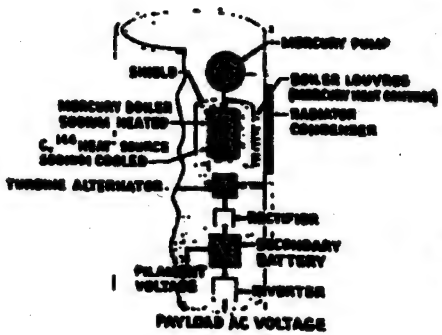
(a) 3KW CONTINUOUSLY

(b) LONG DURATION (~1 YEAR)

(c) SHIELDING REQUIRED (OR SEPARATION)

(d) PAYLOAD COMPATABILITY PROBLEMS

ISOTOPE



CHARACTERISTICS

(a) 500 WATTS AT 60 DAYS

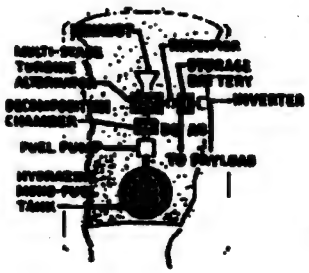
(b) 250 WATTS AT 340 DAYS

(c) TUBE FILAMENTS PROVIDE PARASITIC RESISTIVE LOAD FOR EXCESS POWER IN EARLY VEHICLE LIFE DURING COAST PERIODS

(d) SHIELDING REQUIRED

(e) TOTAL WEIGHT WITH SHIELD 700-800 POUNDS

CHEMICAL (POWER SOURCE)



CHARACTERISTICS

(a) LIFE LIMITED BY MONOFUEL SUPPLY

(b) EXHAUST PRODUCTS USEFUL FOR ORBIT ECCENTRICITY CONTROL

(c) POWER LEVEL EASILY CONTROLLABLE

P162 4/8/57

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LOCKHEED AIRCRAFT CORPORATION

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MISSILE SYSTEMS DIVISION

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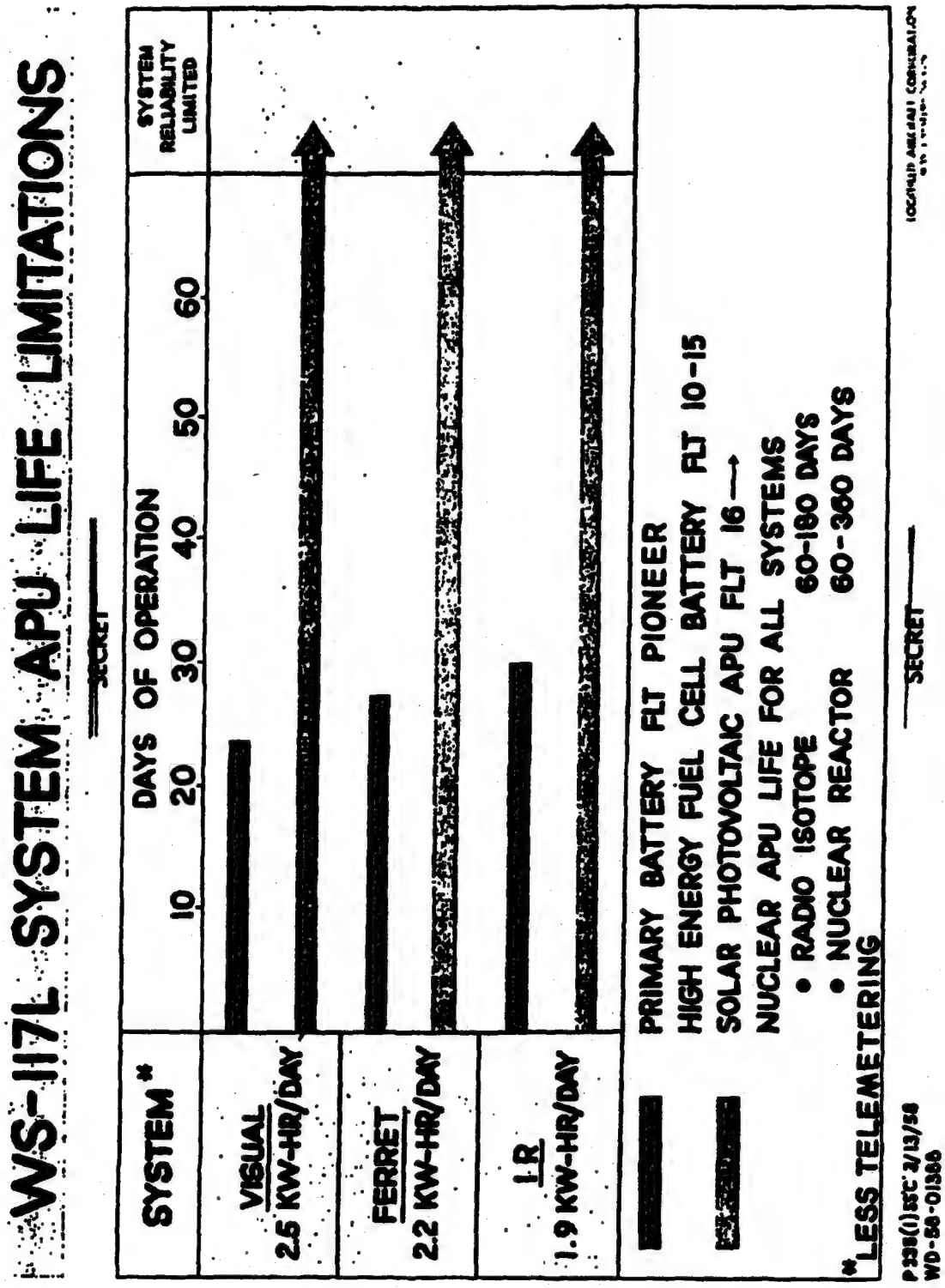

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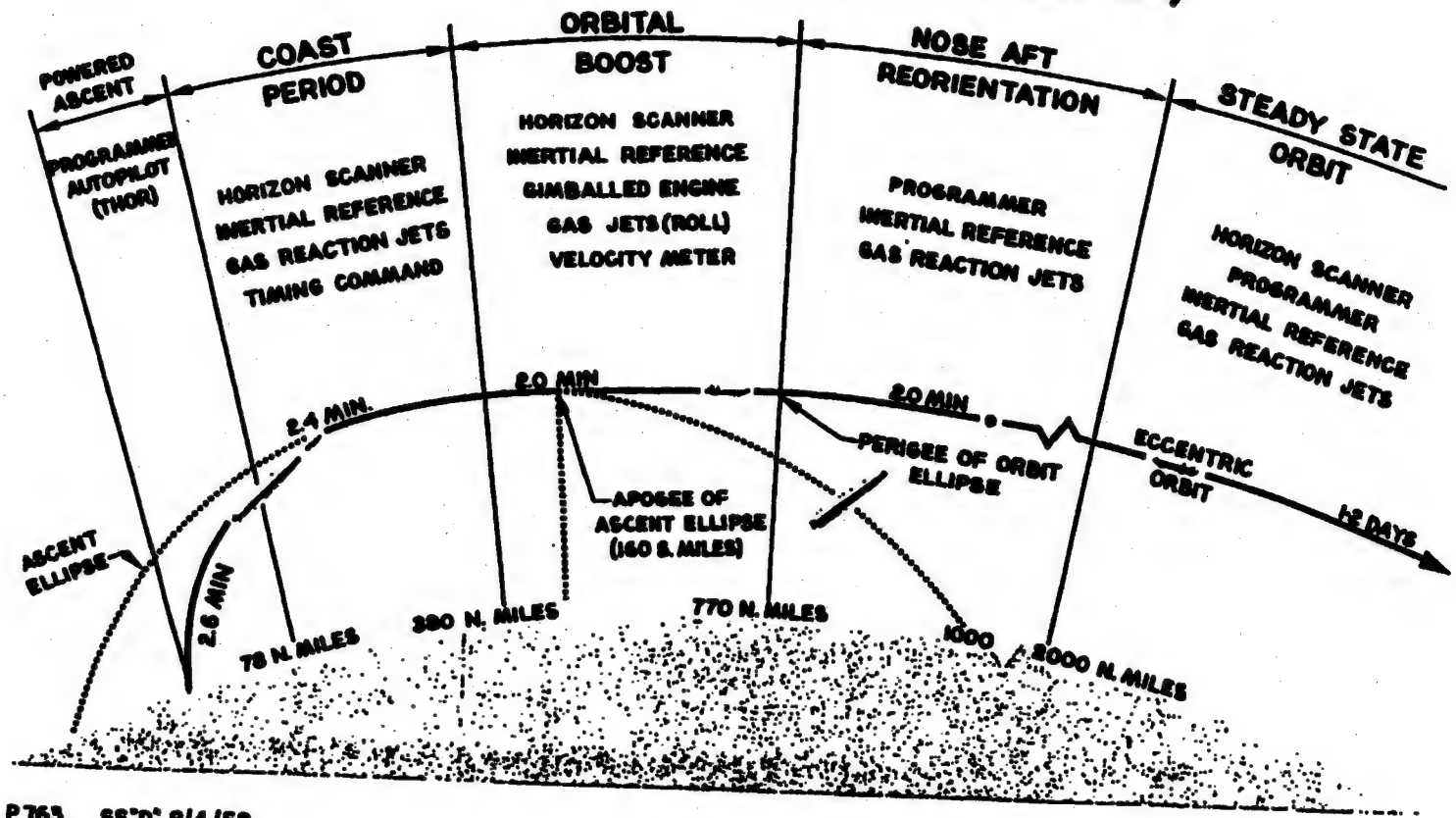
SECRET

GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (THOR-PROG. IIA)



P 763 SS"D" 8/4/58
WD-58-05183

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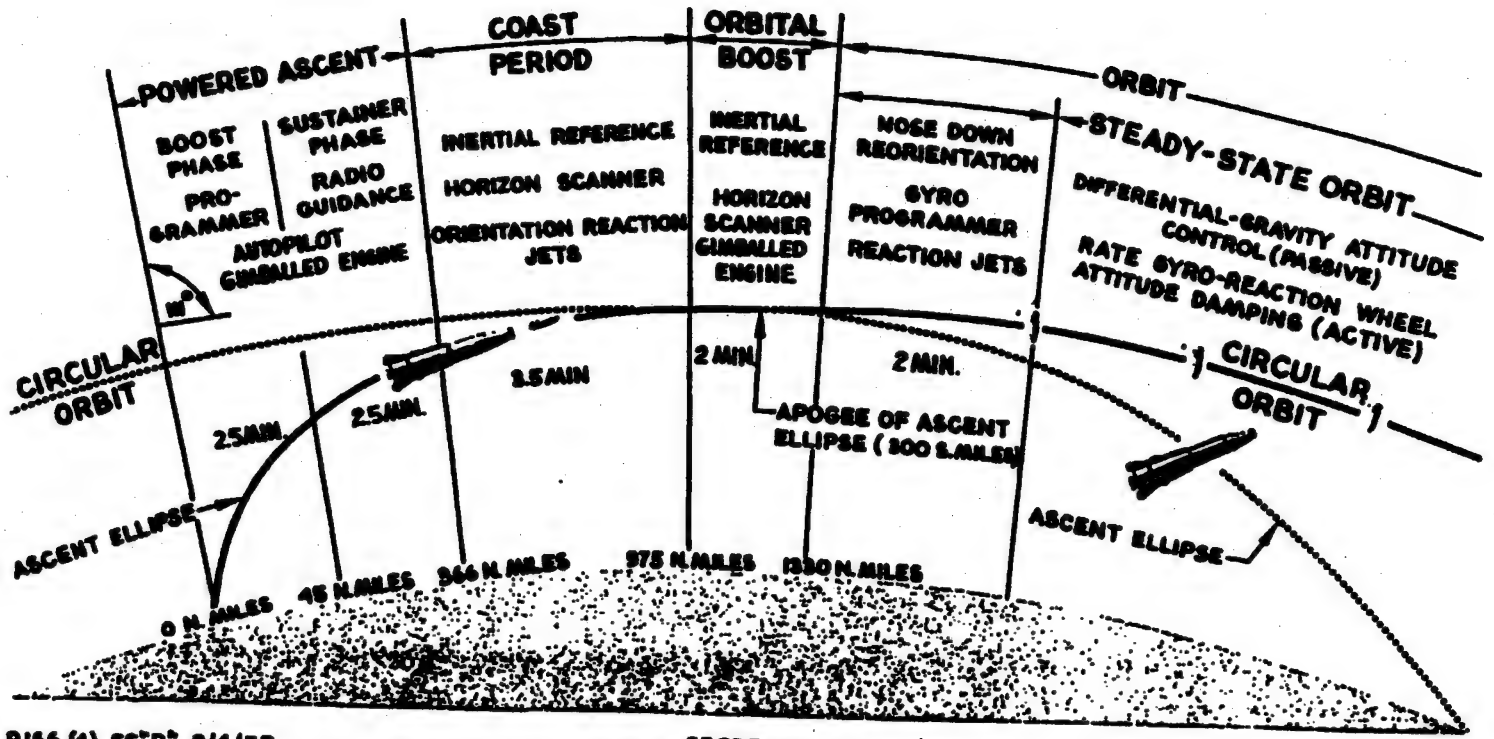
SECRET

GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (ATLAS-PROG I)



P156 (4) 55"D" 8/4/58
WD-58-05183

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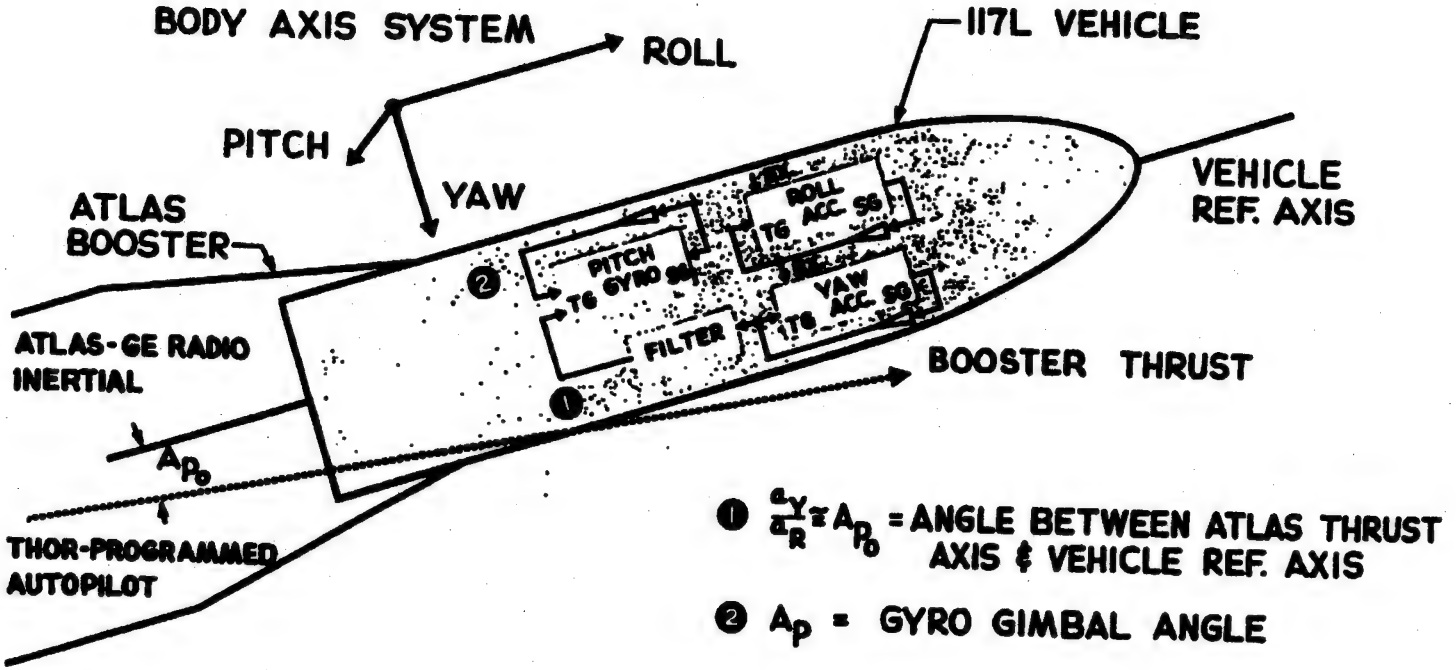
SENTRY ASCENT BOOST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



1 $\frac{a_Y}{a_R} \cong A_{p_0}$ = ANGLE BETWEEN ATLAS THRUST AXIS & VEHICLE REF. AXIS

2 A_p = GYRO GIMBAL ANGLE

P-707 (1) 55"B" 7/22/59
WD-59-04445

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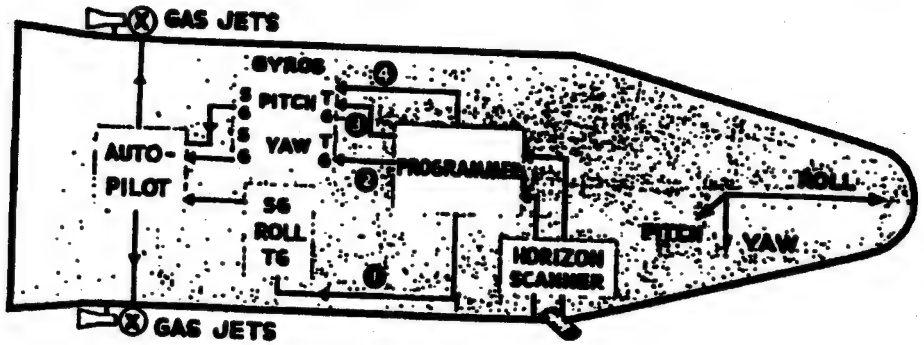
SECRET

SENTRY COAST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



❶ HORIZON SCANNER ROLL ERROR SIGNAL
❷ YAW ANGLE RESET
❸ HORIZON SCANNER PITCH ERROR SIGNAL
❹ PROGRAM PITCH RATE

PROGRAMMER COMMANDS
GYRO PACKAGE REF. ATTITUDE,
GAS JETS VIA AUTOPILOT
ALIGN VEHICLE ATTITUDE
TO GYRO REF. ATTITUDE.

P 708 (1) 55 "D" 7/22/58
WP- 58- 04445

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MISSILE SYSTEMS DIVISION
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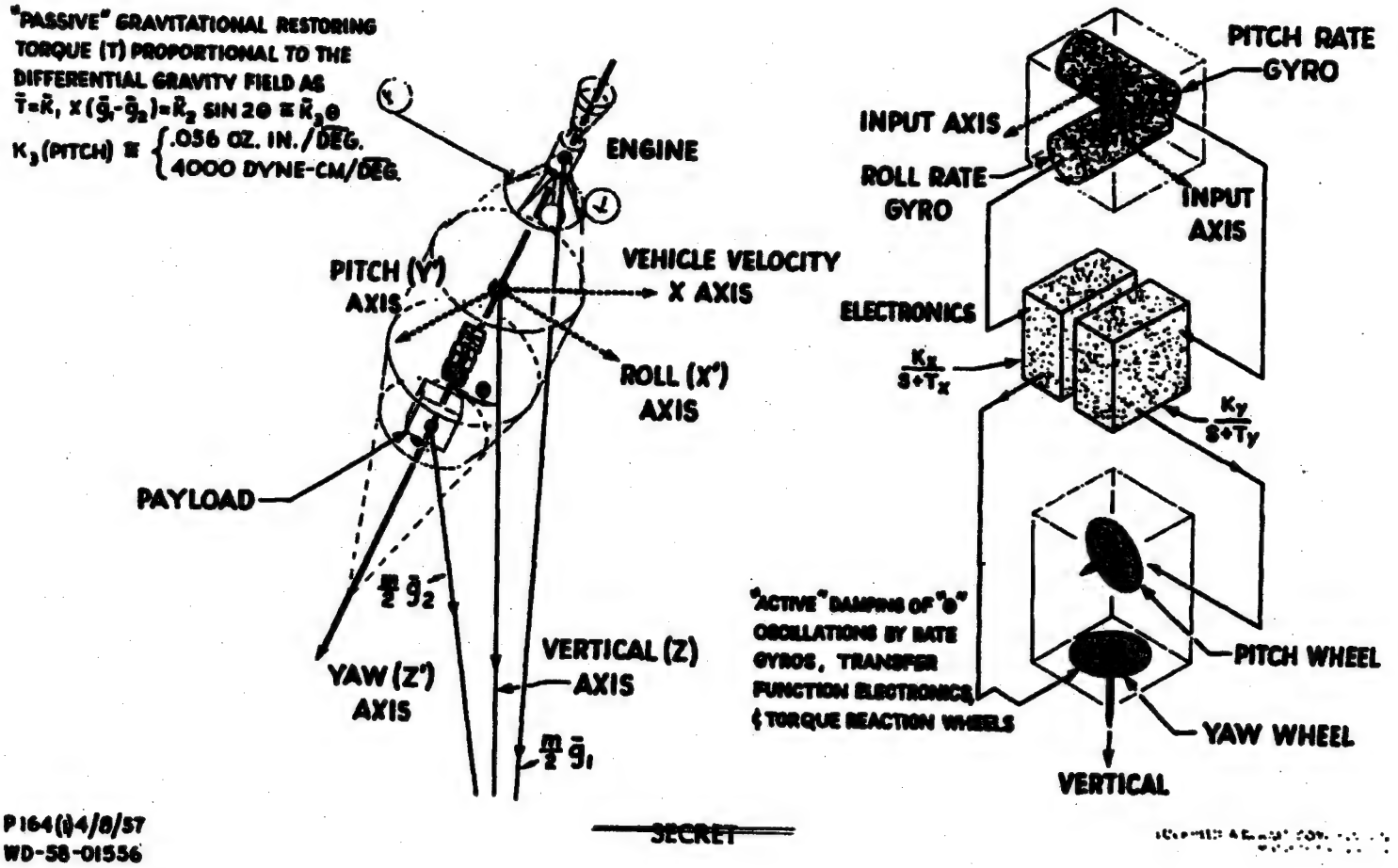
STEADY-STATE ORBITAL ATTITUDE CONTROL SYSTEM

(PITCH CASE-TYPICAL)



P164(i)4/8/57
WD-58-01556

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WS117L SENTRY VEHICLE WEIGHT

	PROGRAM IIA[1] LBS.	PROGRAM I[2] LBS.
VEHICLE PAYLOAD (INCLUDES PRIMARY PAYLOAD & A.R.S. TELEMETRY, & COMMUNICATIONS)	573	3197
STRUCTURE GROUP (INCLUDES AIRFRAME & EQUIPMENT SUPT. STRUCTURE)	402	554
PROPULSION GROUP (INCLUDES ENGINE, PROPELLANT TANKS, PRESS. SYSTEM & ULLAGE ROCKETS)	593	593
CONTROLS GROUP (INCLUDES ASCENT & ORBITAL CONTROLS)	160	123
GUIDANCE GROUP (INCLUDES ASCENT & ORBITAL GUIDANCE)	100	140
VEHICLE WEIGHT EMPTY	1828	4607
PROPELLANTS	6624	4693
BOOSTER PAYLOAD	8452	9300
VEHICLE WEIGHT ON ORBIT	1776	4466

(1) UDMH-IRFNA ENGINE & LAUNCHED FROM CAMP COOKE-THOR BOOSTED NOM. CIRCULAR ORBIT ALTITUDE = 160 STATUTE MILES

(2) UDMH-IRFNA ENGINE & LAUNCHED FROM AFMTC - ATLAS BOOSTED NOM. CIRCULAR ORBIT ALTITUDE = 300 STATUTE MILES

P 262 (3) S 7/17/58
WD-58-04445

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SECRET

W5-117L VISUAL RECONNAISSANCE SYSTEM

SECRET

TECHNICAL SUMMARY

	PIONEER	ADVANCED
FOCAL LENGTH	6"	36"
LENS SPEED	f 2.8	f 2.8
DURATION	9 DAYS	30 DAYS
STRIP ON GROUND - WIDTH	100 MI.	17 MI.
STRIP ON GROUND - LENGTH	2000 MI. AVG.	360 MI. INTERMITTENT
AREA COVERED	1.07×10^7 SQ. MI.	9.9×10^5 SQ. MI.
CAMERA WT. INCLUDES FILM & PROCESSOR	300 LB. 3.4 LB.	400 LB. (EST.) 11.4 LB.

	PIONEER	ADVANCED
ELECTRICAL POWER REQUIREMENTS		
PEAK	300 WATTS	300 WATTS
AVERAGE	660 WATT HR/DAY	660 WATT HR/DAY
SCALE ON VEHICLE FILM	1:3,168,000	1:528,000
RESOLUTION ON GROUND AT LOW (2:1) CONTRAST	100 FT.	20 FT.

FILM USED: MICROFILE EASTMAN F5740-6

FILM RESOLUTION: 250 ℓ/mm HIGH CONTRAST

> 100 ℓ/mm LOW CONTRAST

GROUND ENLARGEMENT 53:1 FOR USE

P400 SS-E 12/9/57

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WS117L FERRET SUBSYSTEM-PROJECT STRUCTURE

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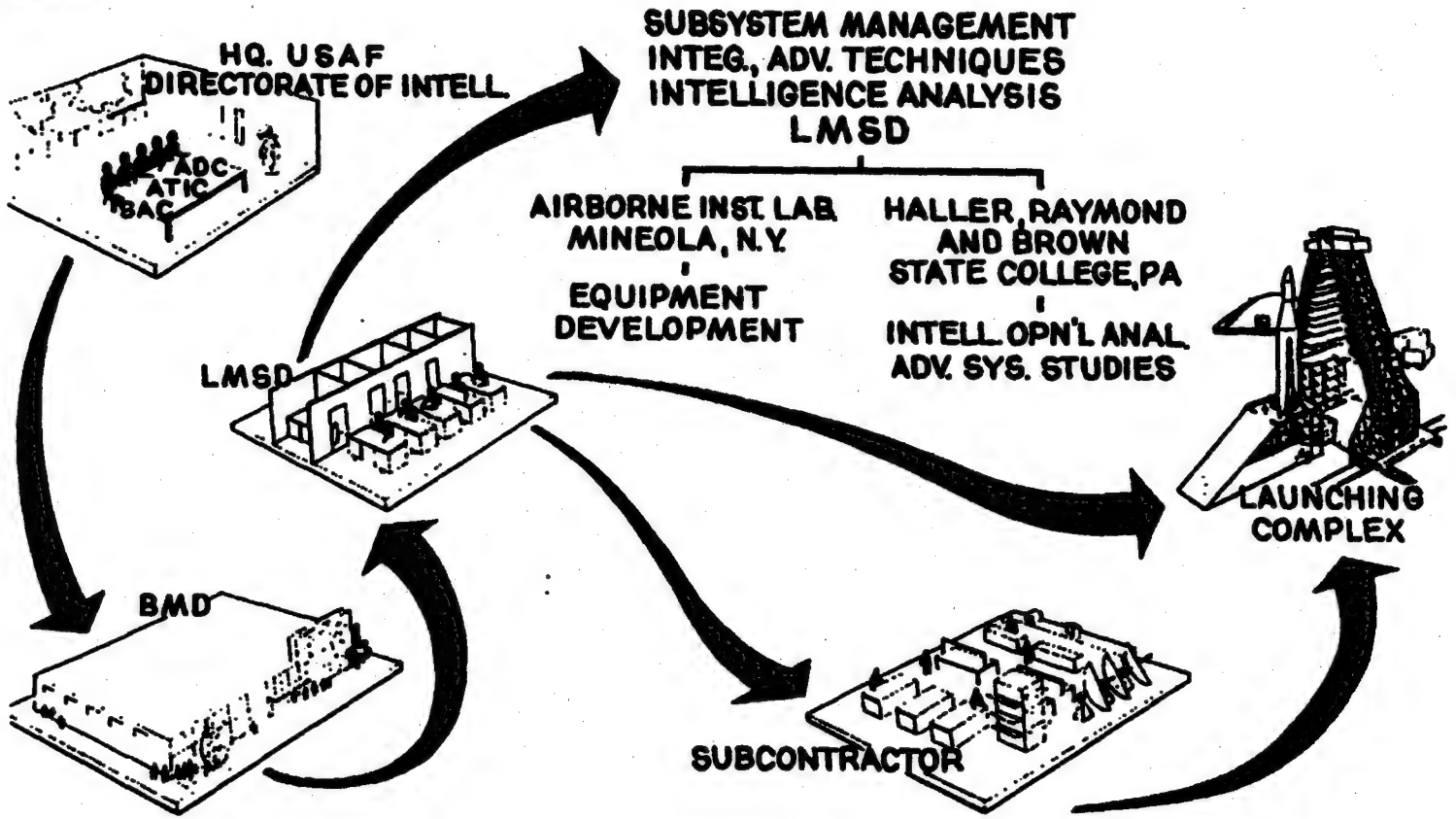

P175 (4) 6/30/58 SS"F"
WD-58-03455

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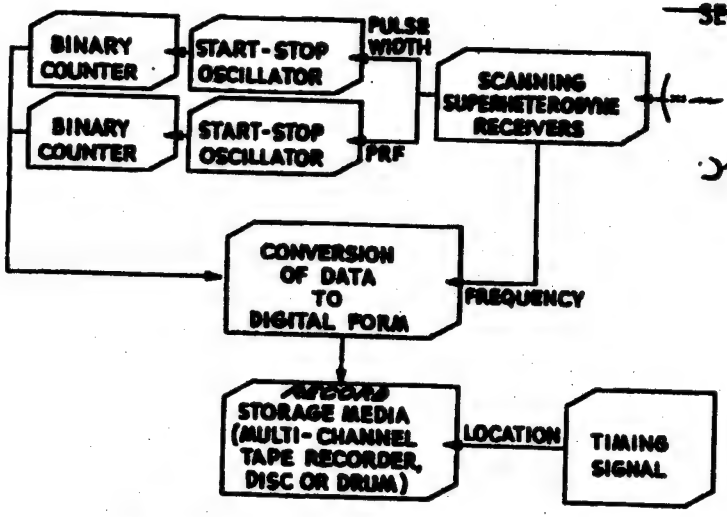
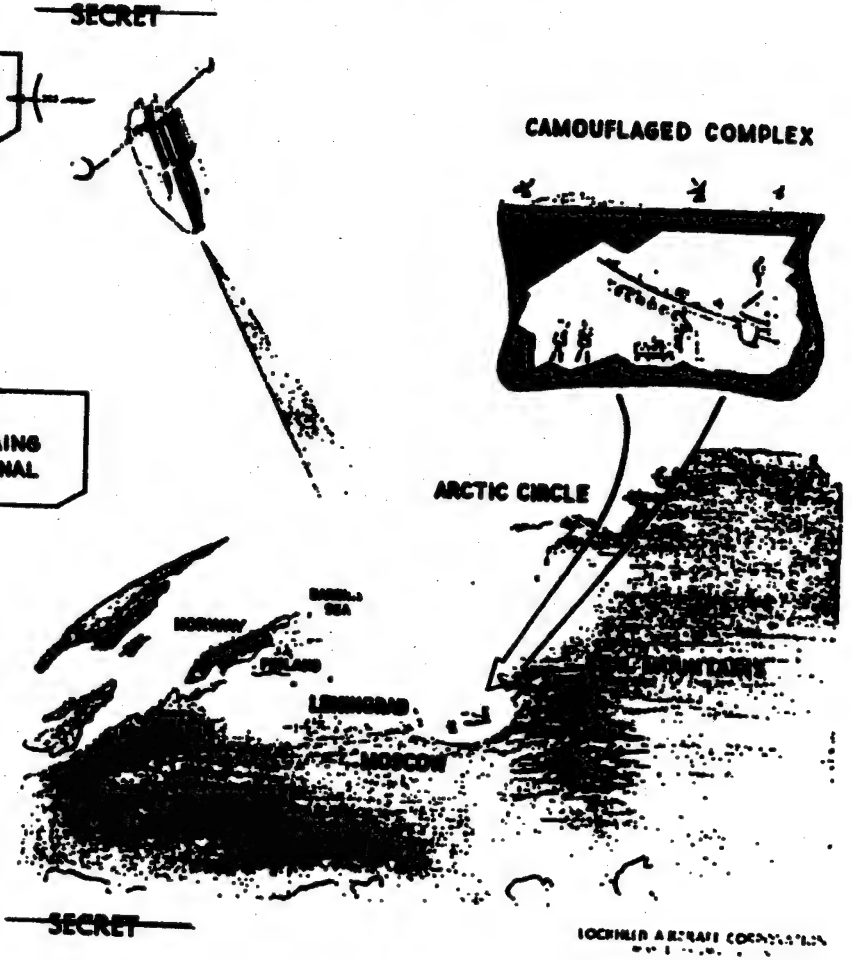
AIRBORNE RECEPTION

SECRET





PRIORITY BANDS

1. 2,500-3,200 MC/SEC
2. 9,000-10,000 MC/SEC
3. (a) 59-100 MC/SEC
   (b) 100-200 MC/SEC
   (c) 200-400 MC/SEC
   (d) 400-650 MC/SEC

MONITORING OF ALL BANDS IN THE 50-18000 MC/SEC SPECTRUM

P182(3) SST 1/22/58
WD-58 00001

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•ICBM ATTACK ALARM

SECRET

SECRET

LOCKHEED AIRCRAFT CORPORATION

MISSILE SYSTEMS DIVISION

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PROPOSED ICBM ATTACK ALARM SYSTEM

SECRET

SATELLITE POWER REQM'TS VS. SUPPLY

POWER REQUIREMENTS

UNIT	WATT HR/DAY
TRANSMITTER	171
RECEIVER	117
DECODER	176
TIMER & PROGRAMMER	120
SUBSYSTEM "G"	180
ATTITUDE DAMPING SYST.	240
YAW STAB. GYRO WHEEL	96
TOTAL REQM'T	1100

SOLAR POWER SUPPLY

UNIT	WATT HR/DAY
SOLAR CELL OUTPUT	3796
LOSS: DEGRADATION, CONVERSION STORAGE, REGULATION OTHER	2548
TOTAL USEFUL POWER FOR EQUIP.	1248

- 80 FT² SOLAR CELLS REQUIRED AT 1000 N. MI. ALTITUDE ON MOON ORBIT
- OVERALL PERFORMANCE FACTOR - 33%

P609(1) SS"B" 6/24/58
WD-58-034-55

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ICBM ATTACK ALARM SYSTEM

SECRET

VEHICLE PAYLOAD

EQUIPMENT	DESCRIPTION
INFRARED	BOUWERS CONCENTRIC OPTICAL SYSTEM 7-INCH APERTURE; 1.3 APERTURE RATIO UNCOOLED LEAD-SULPHIDE DETECTORS MODULATING RETICLE MOUNTED ON ROTATING SCANNER FRAME TRANSISTORIZED INFRARED SIGNAL AMPLIFIERS
COMMUNICATIONS	TRANSMITTER & MODULATORS COMMAND RECEIVER DECODER TIMER/PROGRAMMER 4 QUADRANT RECEIVING ANTENNAS TRANSMITTER ANTENNA
AUX. POWER	SOLAR ENERGY COLLECTOR CELLS 400 CYCLE INVERTER 2000 CYCLE INVERTER 28V DC REGULATOR NICKEL-CADMIUM BATTERY

LOCKHEED AIRCRAFT CORPORATION — SECRET — MISSILE SYSTEMS DIVISION

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PROPOSED ICBM ATTACK ALARM SYSTEM

SECRET

OPERATIONAL GROUND BASE REQUIREMENTS

1. LAUNCH SITE - COOKE AIR FORCE BASE

- LAUNCH PADS — THREE
- GRND. SUPP. EQUIP. — THREE SETS
- ASSEMBLY HANGARS — ONE

2. TRACKING STATIONS - NORTHEAST, NORTHWEST, & SOUTH CENTRAL

- SAME UHF INSTALLATIONS AS PROGRAMS I, II, & III
  (IF VHF IS UTILIZED, ADDITIONAL EQUIPMENT REQUIRED)

3. READ OUT STATIONS - THULE, GREENLAND; FAIRBANKS, ALS; N. SCOTLAND

- THREE 60 FT. TRACKING ANTENNAS FOR IR DATA & TELEMETRY RECEPTION.
- THREE DATA LINK & THREE TELEMETRY RECEIVERS.
- TWO DIRECTION FINDERS & TWO COMMAND TRANSMITTERS WITH ANTENNAS.
- THREE SETS OF DISPLAY CONSOLES & CONTROL CONSOLES.
- MASTER CONTROL CONSOLE, DATA RECEIVERS, ORBIT TRACKING PROGRAMMER.

P6I7(2) 55"6" 8/4/58
WD-58-03455

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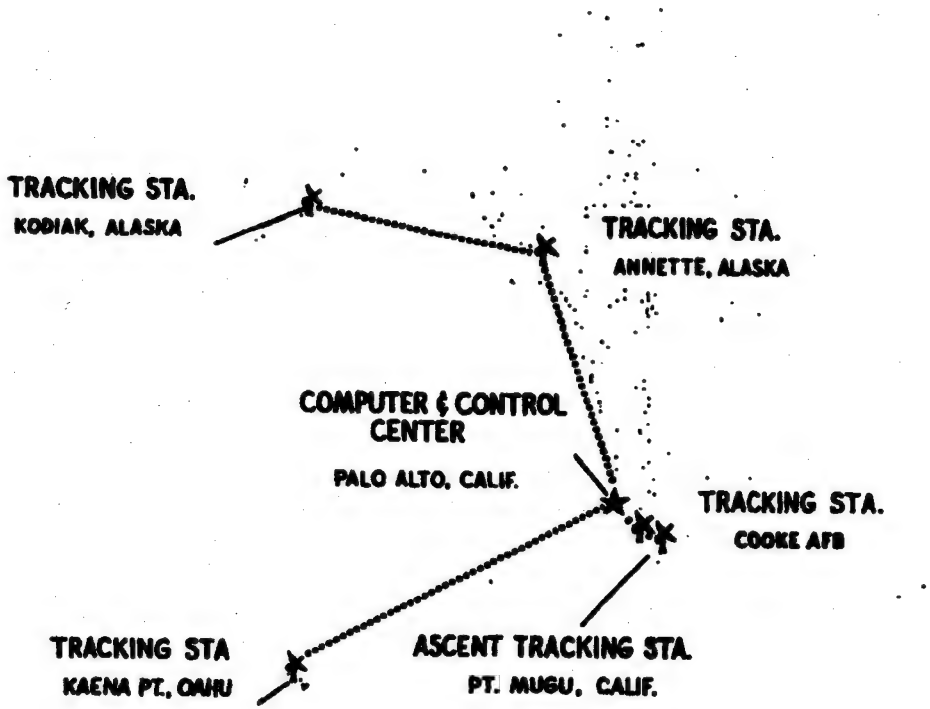
STATION LOCATIONS (THOR)



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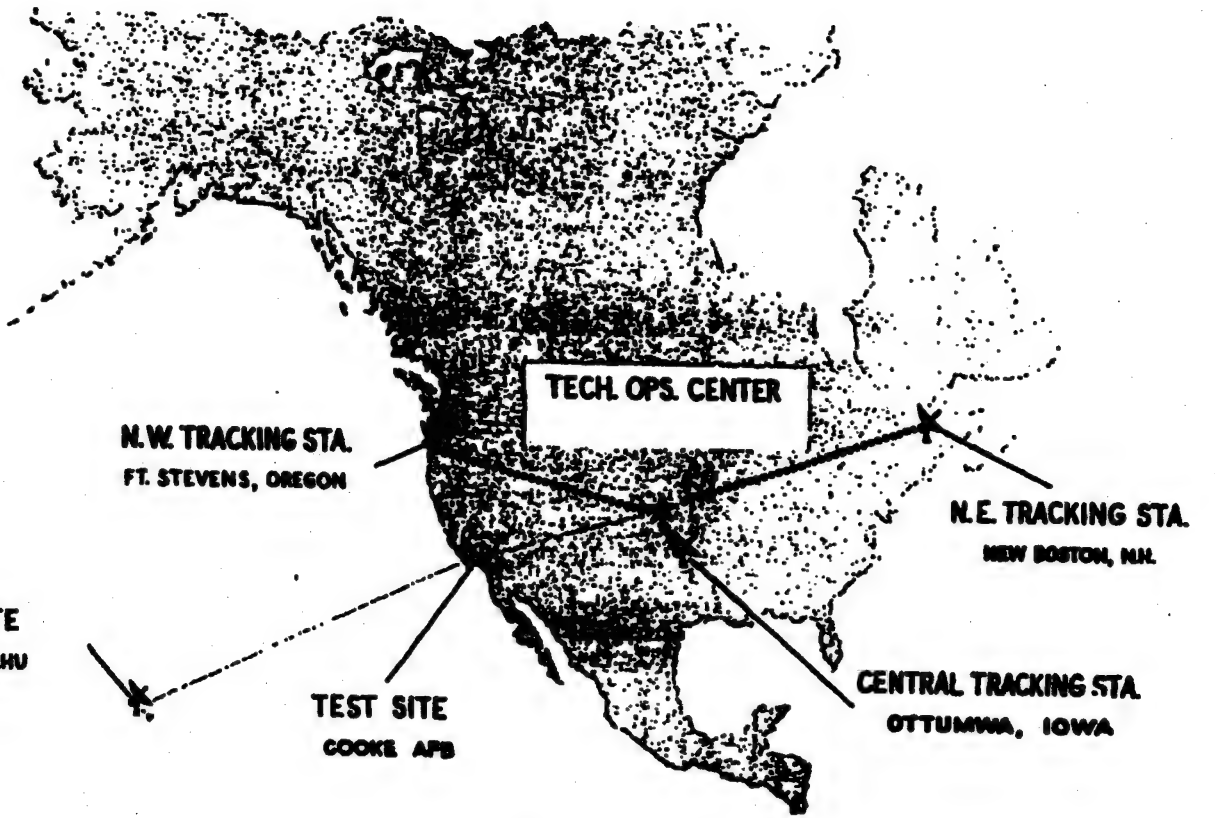
STATION LOCATIONS (ATLAS)



P 513 030 55"W 7/6/59
WD-59-04445

SECRET

SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

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G-S COMMUNICATION-INTERCEPT STATION

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P 183(2) SS-H 7/16/57

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ORBITING OBJECT - TRAFFIC INTELLIGENCE

SECRET

- IDENTIFY & TRACK VEHICLES ENTERING ORBIT
  - ATTACK ALARM SYSTEM
  - PRECISION TRACKING & PREDICTION SYSTEM
- MAINTAIN DATA ON ACTIVE U.S. VEHICLES
  - BEACON TRACKING
  - ORBIT PREDICTION
- MAINTAIN DATA ON INACTIVE U.S. VEHICLES
  - SKIN TRACKING (VISUAL & IR TRACKING)
  - ORBIT COMPUTATIONS
- MAINTAIN DATA ON FOREIGN VEHICLES
  - SKIN TRACKING (VISUAL & IR TRACKING)
  - RAPID ORBIT & TRAJECTORY COMPUTATIONS

P540 GDC 5/12/58
WD-58-02843

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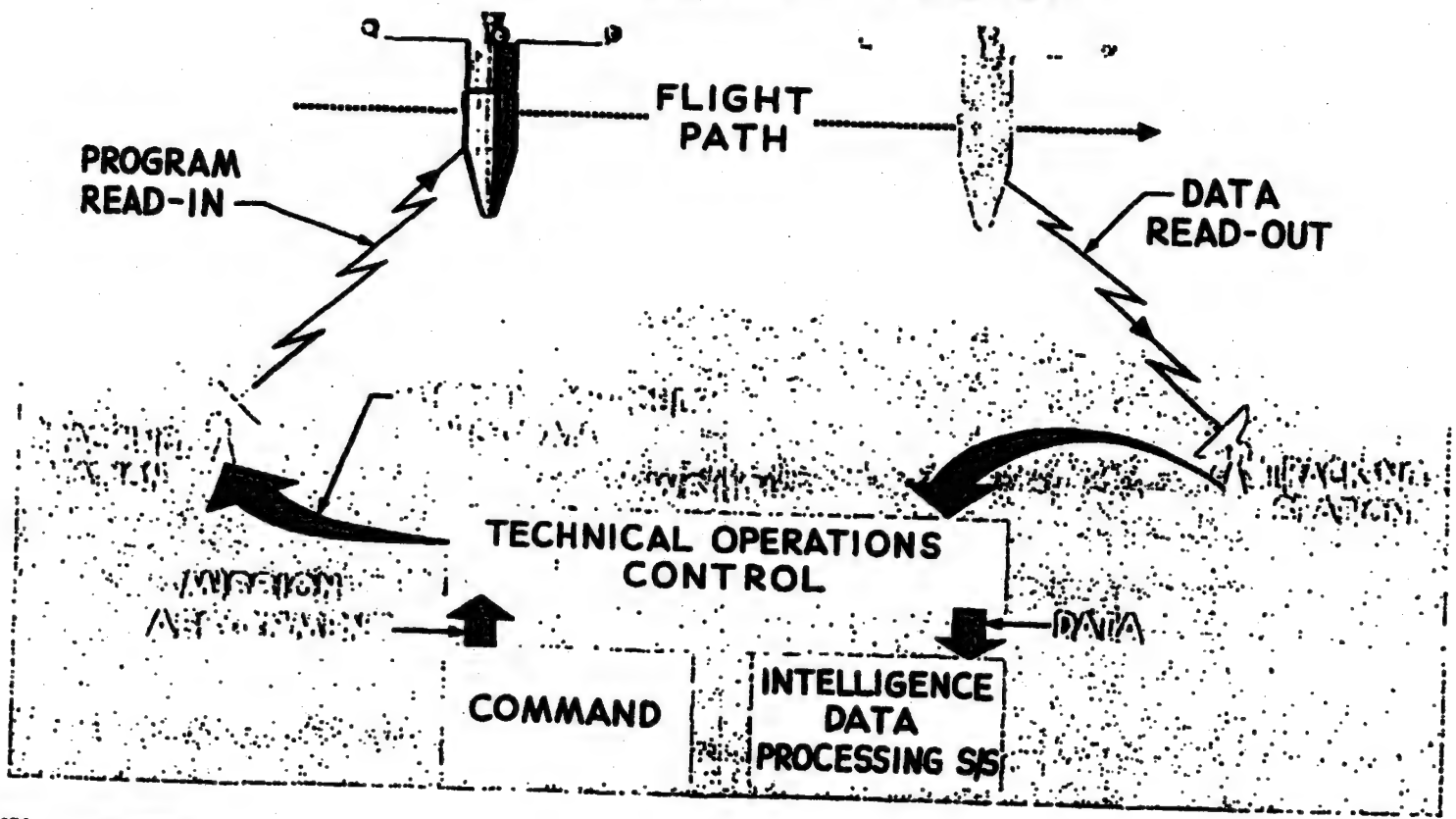
WS117L DATA CONTROL



P-664 DCA 711/55
WD-55-04445

LOCKHEED AIRCRAFT CORPORATION — SECRET — MISSILE SYSTEMS DIVISION

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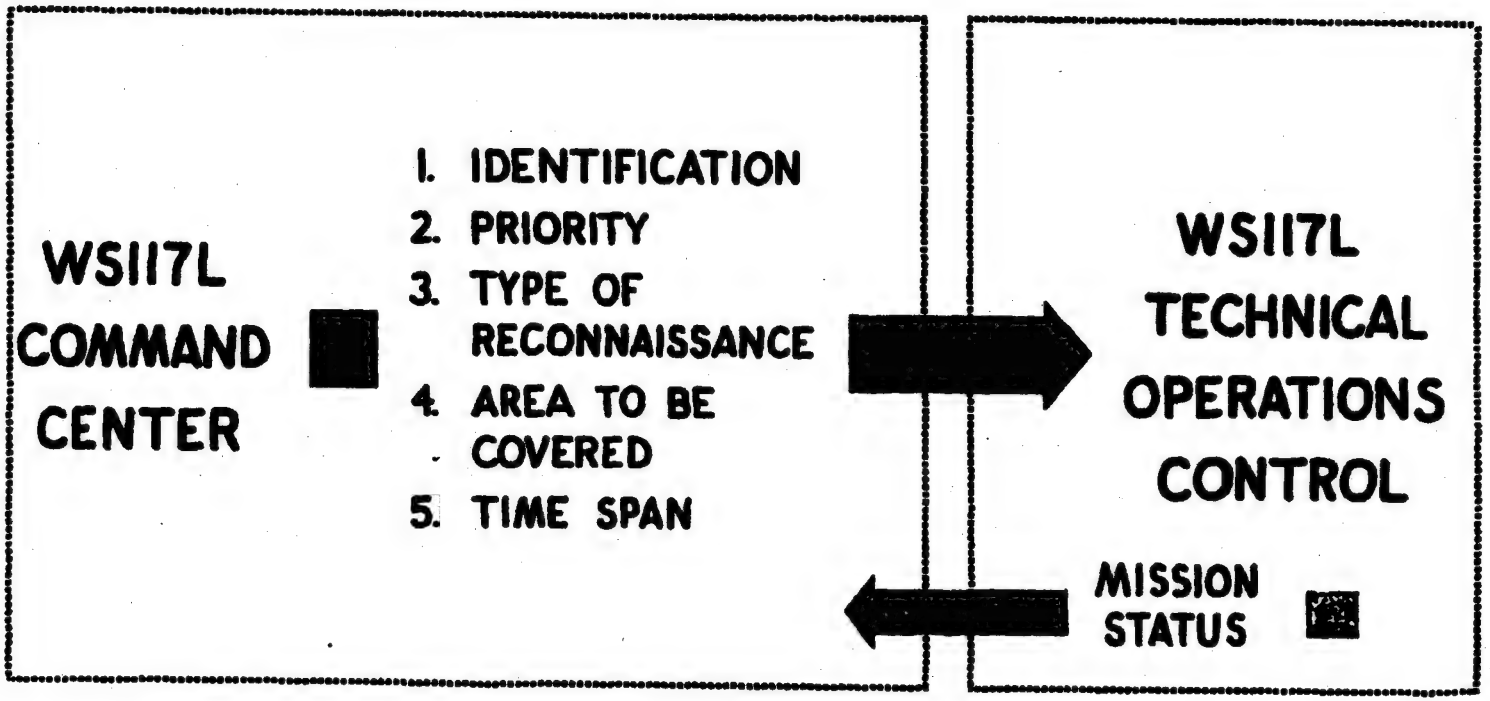
WS117L DATA CONTROL

RECONNAISSANCE MISSION ASSIGNMENT



P-683 DCA 7/N/59
WD-58-04441

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LOCKHEED AIRCRAFT CORPORATION
SECRET
MISSILE SYSTEMS DIVISION
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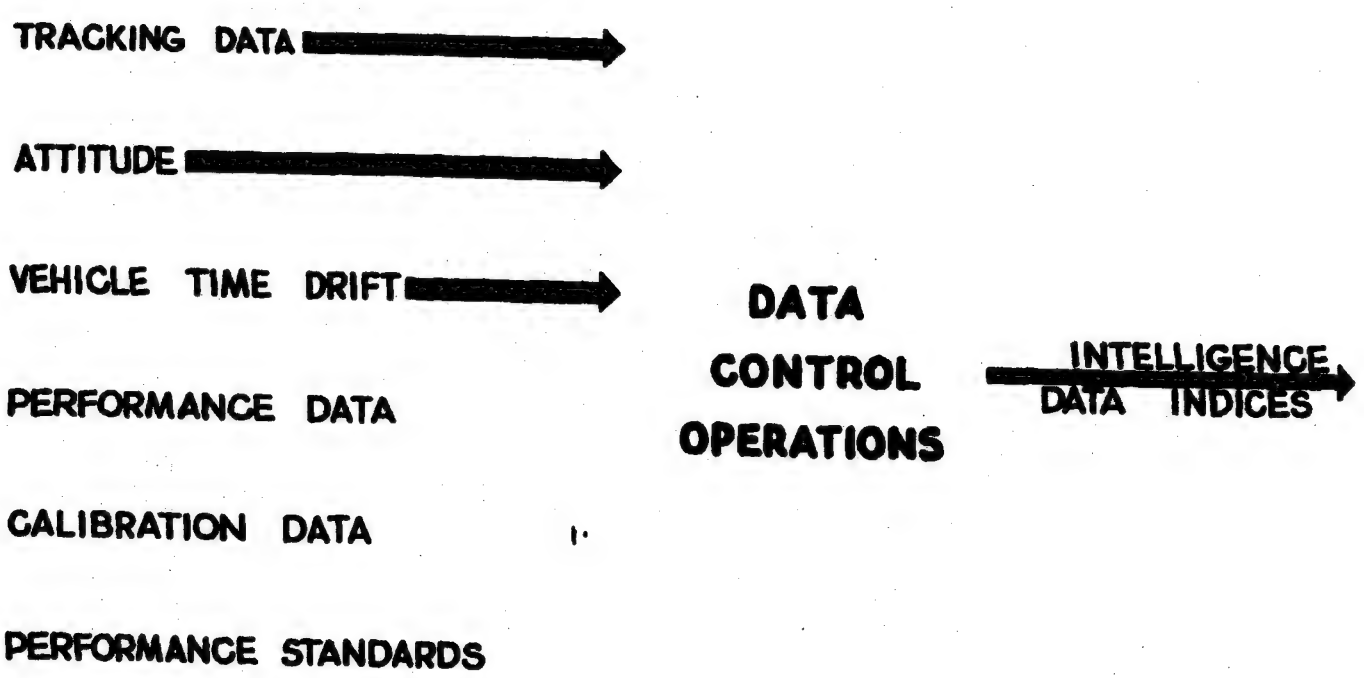
WS117L DATA CONTROL

DATA INDEXING



SECRET

WS 117L/SM-75 PROGRAM OBJECTIVES

SECRET

PRIMARY

- LAUNCH OF WS 117L/SM-75 COMBINATION
- ACHIEVEMENT OF ORBIT
- DEVEL. WS117L AIRBORNE & GROUND SYSTEMS
- DEVEL. OF GROUND/SPACE COMMUNICATIONS

SECONDARY

- RECOVERY
- AEROMEDICAL MEASUREMENTS
- G. R. D. MEASUREMENTS

P-465 SO 3/24/58
WD-58-01388

SECRET

SECRET

LOCKHEED AIRCRAFT CORPORATION — SECRET — MISSILE SYSTEMS DIVISION

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FLIGHT MISSIONS & OBJECTIVES

PROGRAM II A

FLT	NOM. CIRCULAR ORBIT ENERGY ALT. S.MI.	EMPTY WT. ON ORBIT	ATT.	PAYLOAD	FUEL	NOZZLE EXP. RATIO	FLT. OBJECTIVES
1	225	1275	VERT.		JP4/IRFNA	14.85:1	PHASE A ENGINEERING TESTS
2	190	1359	"		"	"	PHASE A ENGINEERING TESTS
3 & 4	145 (H_p=125 S.MI. e=.02 165° LAUNCH AZIMUTH)	1547	HORIZ.	195# CAPSULE ALBEDO FLT 3 DENSITY FLT 4	"	"	BIO-MEDICAL EXPERIMENT
5-7-9	240	1458	"	GRD. ALBEDO DENSITY COSMIC RAY	UDMH/IRFNA	20:1	PHASE B ENGINEERING TESTS
6-8 & 10 THRU 14	160 (H_p=140 S.MI. e=.02 180° LAUNCH AZIMUTH)	1649	"	250 LB. CAPSULE	"	"	BIO-MEDICAL EXPERIMENT

PS91 (4) 8 8/4/58
WD-58-04445

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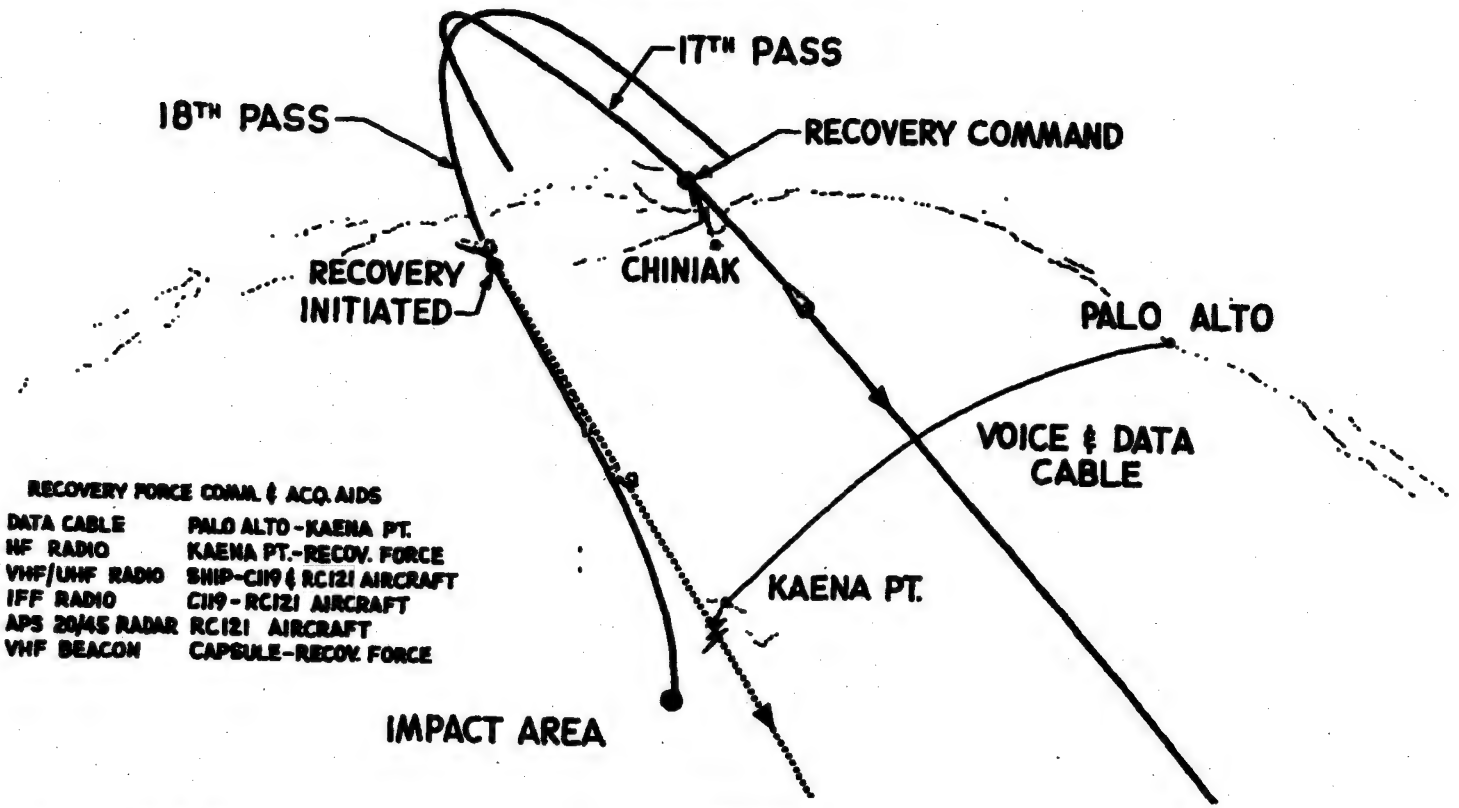
SECRET

WS117L RECOVERY ORBITS

PROGRAM IIA



RECOVERY FORCE COMM. & ACQ. AIDS

DATA CABLE	PALO ALTO - KAENA PT.
HF RADIO	KAENA PT. - RECOV. FORCE
VHF/UHF RADIO	SHIP-C119 & RC121 AIRCRAFT
IFF RADIO	C119 - RC121 AIRCRAFT
APS 20/45 RADAR	RC121 AIRCRAFT
VHF BEACON	CAPSULE - RECOV. FORCE

P639 SD 7/7/58
WD-58-04445

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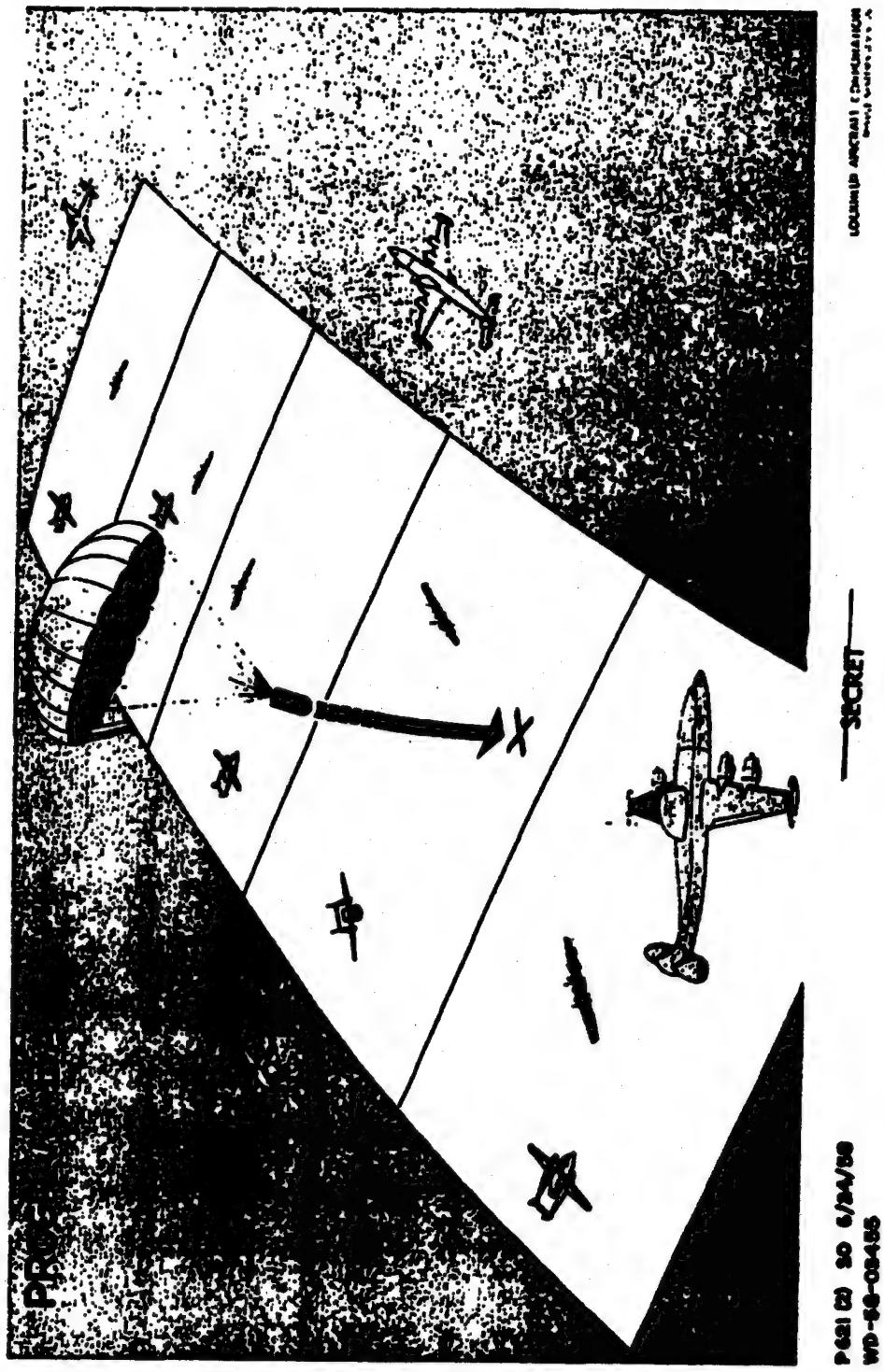
SECRET

SENTRY RECOVERY OPERATIONS



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WS117L CAPSULE RECOVERY

PROGRAM IIA

SECRET

SECRET

P 577 SD 6/24/58
WP-58-00455

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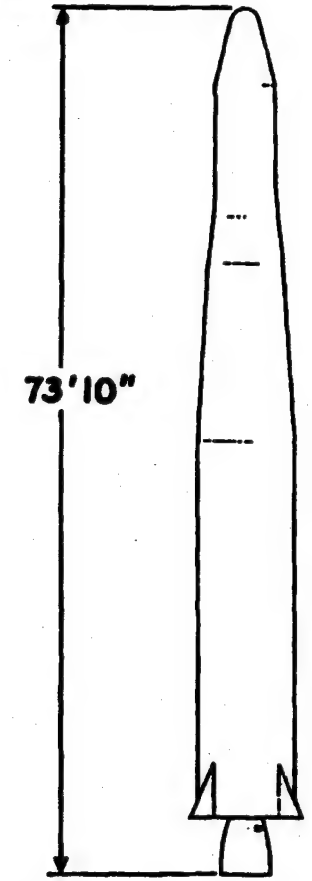
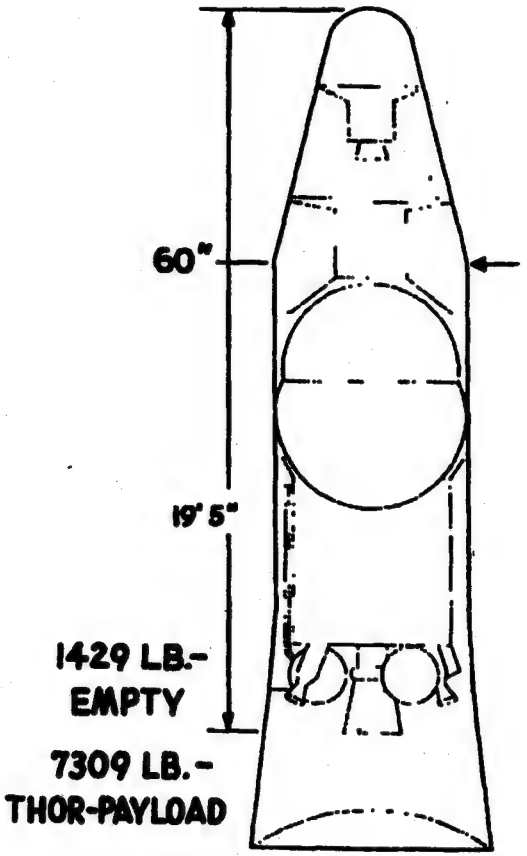
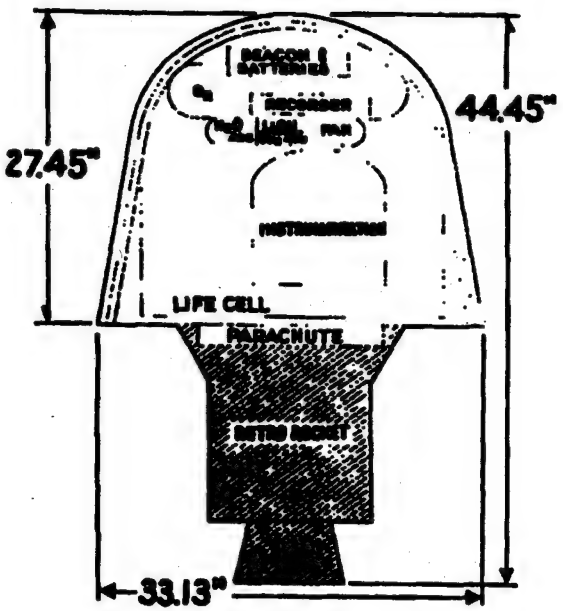
WS117L BIO MED VEHICLE

SECRET





195 LB.- JP4
279 LB.- UDMH



P544(056 "L" 6/3/58
WD-58-03455

SECRET

LOCKHEED AIRCRAFT CORPORATION — SECRET — MISSILE SYSTEMS DIVISION

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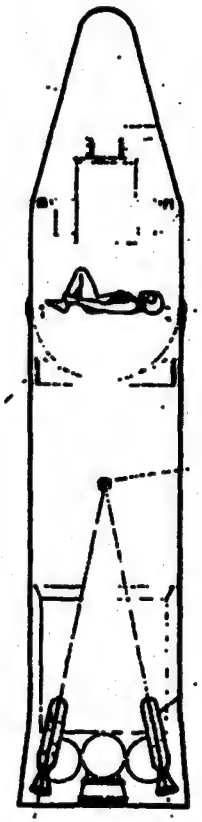
SECRET

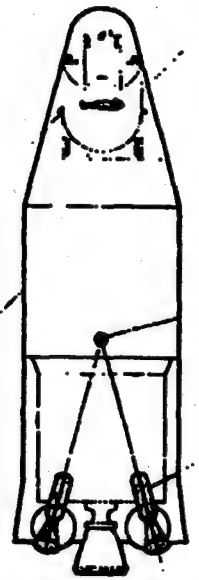
WS117L AERO-MED RECOVERY CONFIGURATIONS

SECRET

MAN



SMALL ANIMAL



SECRET

P475 6 4/30/58
WD-58-0275

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LOCKHEED AIRCRAFT CORPORATION SECRET MISSILE SYSTEMS DIVISION

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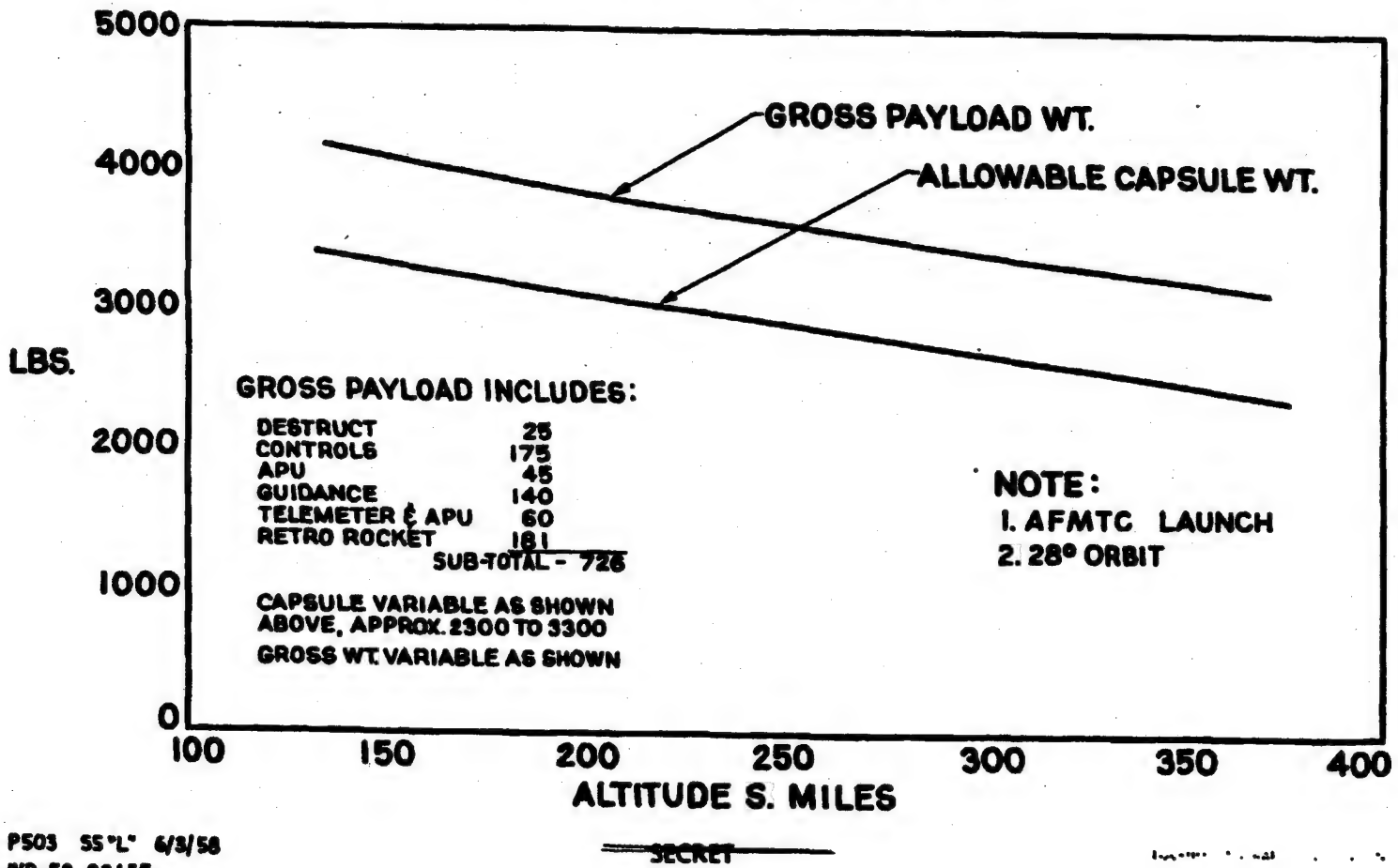
WS117L USEFUL PAYLOAD WEIGHT VS ALT.

SECRET

PROPOSED MAN IN SPACE PROG.



P503 SS "L" 6/3/58
WD-58-03455

SECRET

SECRET

SATELLITE WEATHER MISSIONS

CONFIDENTIAL

SCIENTIFIC RESEARCH
- DETERMINE MEANS FOR UTILIZING SATELLITE DATA
- CORRELATE DATA OVER LARGE AREAS OF EARTH
- PERFORM STUDIES ON WEATHER CONTROL

STORM PATROL
- DETECT PRESENCE OF MAJOR STORM CENTERS
- PERFORM TIMELY TRACKING AND WARNING

DOMESTIC WEATHER FORCASTING
- AUGUMENT PRESENT SYSTEM OF STATIONS
- PROVIDE ADDITIONAL COVERAGE

MILITARY MISSIONS
- WEATHER DATA FOR OPERATIONAL MISSIONS
- INTELLIGENCE INFORMATION
- WS-117L TECHNICAL SCHEDULING

LOCKHEED AIRCRAFT CORPORATION — CONFIDENTIAL — MISSILE SYSTEMS DIVISION

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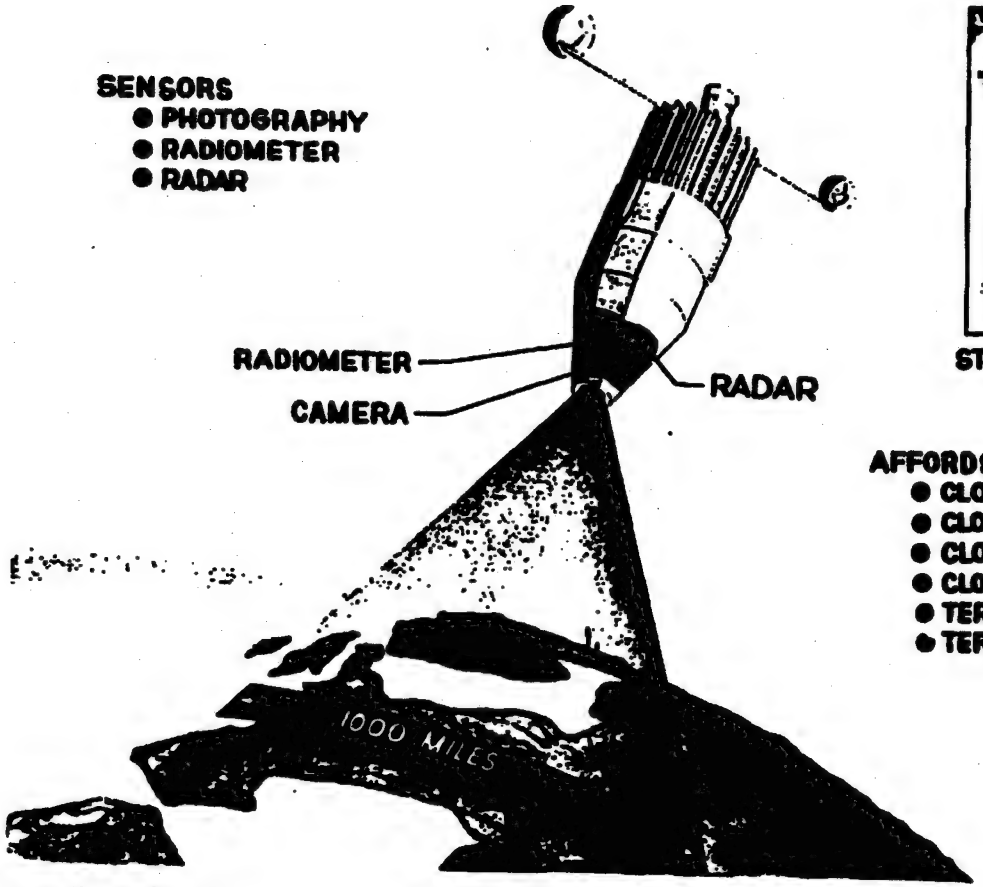
CONFIDENTIAL

SENTRY WEATHER SURVEILLANCE

SENSORS
- PHOTOGRAPHY
- RADIOMETER
- RADAR



STATUS MOSAIC AT WEATHER CENTER

AFFORDS SYNOPTIC RECORD
- CLOUD TYPE
- CLOUD COVER
- CLOUD VELOCITY
- CLOUD ALBEDO
- TERRESTRIAL RADIATION SPECTRUM
- TERRESTRIAL HEAT BALANCE

P 376#6 10/14/57
WD-58-05183

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TYPES OF WEATHER DATA

MILITARY AND DOMESTIC

PRESENT METHODS

- TEMPERATURE
- PRESSURE
- HUMIDITY
- WIND VELOCITY
- RECENT WEATHER HISTORY

SATELLITE DATA

- VISUAL
  - CLOUDS-SEMI QUANTITATIVE
    1. EXISTENCE
    2. WIND VELOCITY
    3. WIND SHEARS
    4. VERTICAL STRUCT
    5. WATER VAPOR
    6. AIR STABILITY
    7. LEE CLOUDS OVER MOUNTAINS
    8. FRONTAL CLOUDS
- RADIO METRIC
  - ALBEDO
  - OZONE CONCENTRATIONS
  - SOLAR RADIATIONS
- RADAR
  - PRECIPITATION
  - ALBEDO

—CONFIDENTIAL—

SECRET

POSSIBLE SCIENTIFIC EXPERIMENTS

UTILIZING WS-117L VEHICLE

	LARGE PAYLOAD	DATA STORAGE & WIDE-BAND TRANSMISSION	LARGE POWER (LONG LIFE)	POLAR ORBIT	CONTROLLED ATTITUDE	INTER-SATELLITE COMM.	COINCIDENCE-TYPE EXPERIMENTS
DRAG							
SOLAR UV, X-RAYS, & TOTAL RADIATION		▲	▲		▲		
PRIMARY AND ALBEDO COSMIC RAYS	●	▲	▲	●	▲		
AURORAL PARTICLES AND X-RAYS		▲	▲	●	▲		
MICROMETEORITES		▲	▲		▲		
MAGNETIC FIELD		●	▲	●			
EARTH RADIATION		●	▲	●	●		
ALBEDO AND CLOUD COVER		●	▲	●	●		
LIGHT ION DETECTOR		●	▲	●			
ION SPECTROMETER	●	●	▲	●	▲		
MICROMETEORITE VELOCITIES		▲	▲		●		
LYMAN-ALPHA TELESCOPE	●	▲	▲		●		
ATOMIC CLOCK	●		▲				
ELECTRON DENSITY IN IONOSPHERE		●	▲	●			
DENSITY AND TEMPERATURE IN ORBIT	▲	●	▲	●	●	●	

▭ NOT NECESSARY FOR THE MEASUREMENT
▲ USEFUL FOR THE MEASUREMENT
● ADDS GREATLY TO VALUE OF MEASUREMENT

P374 G 10/14/57

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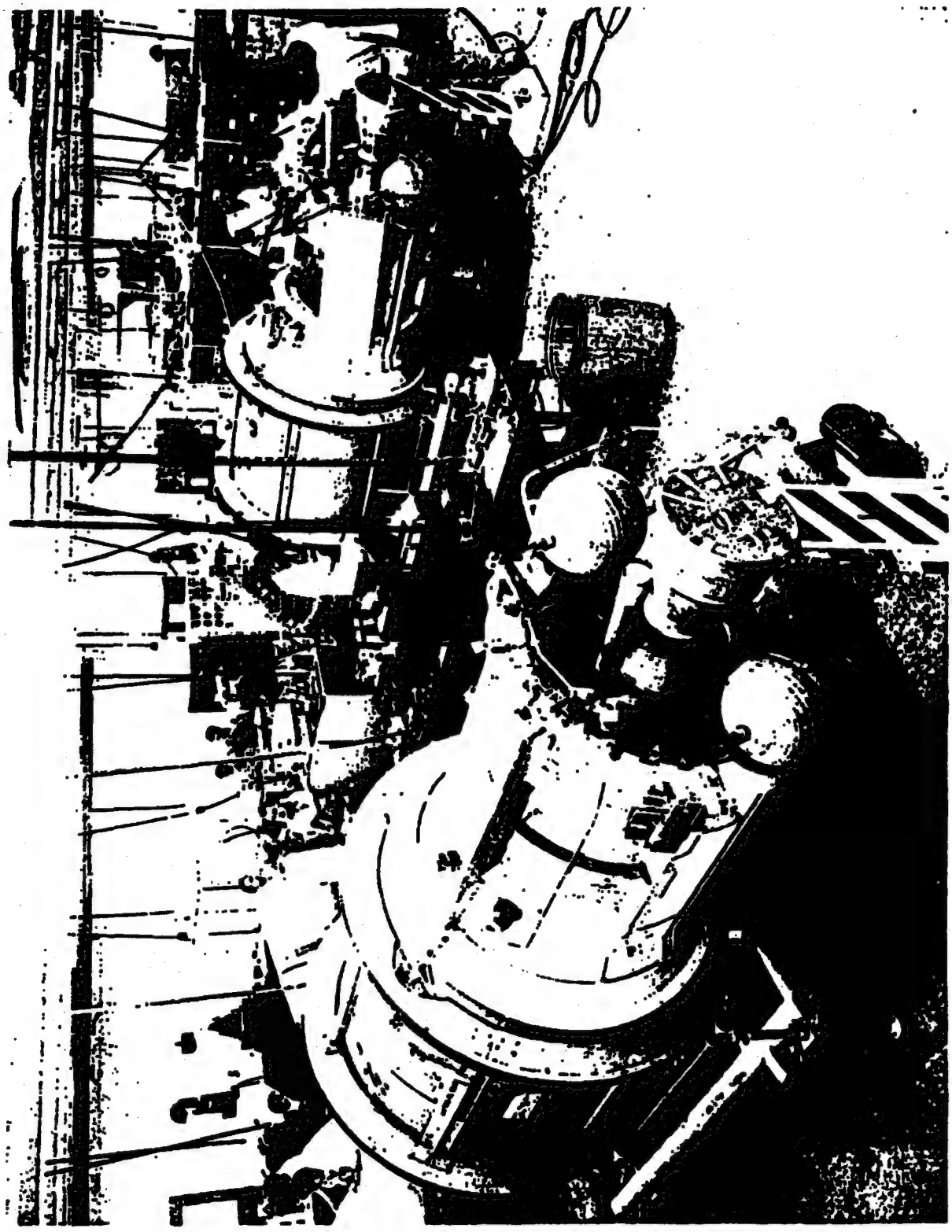

P 3017 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

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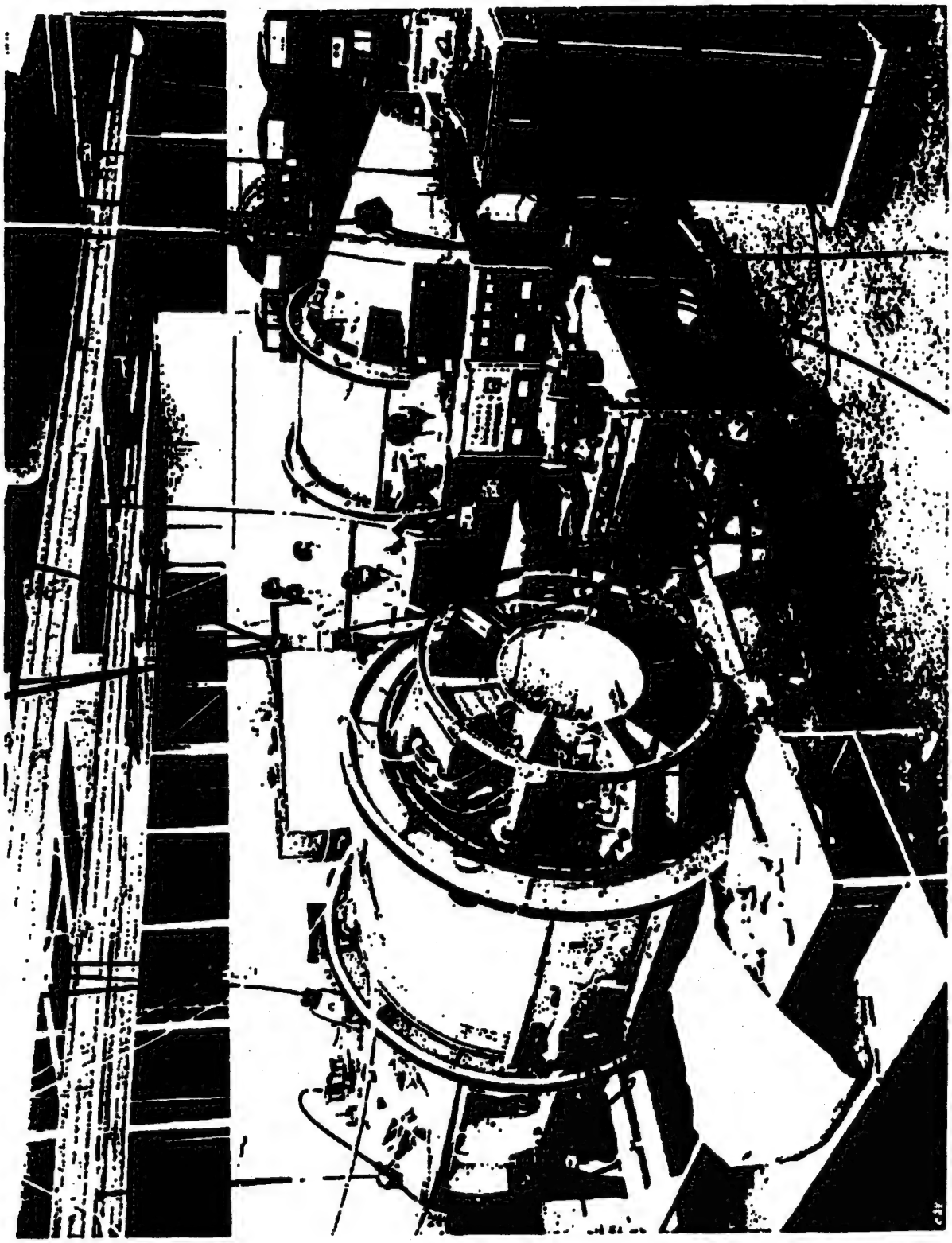

P3018 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

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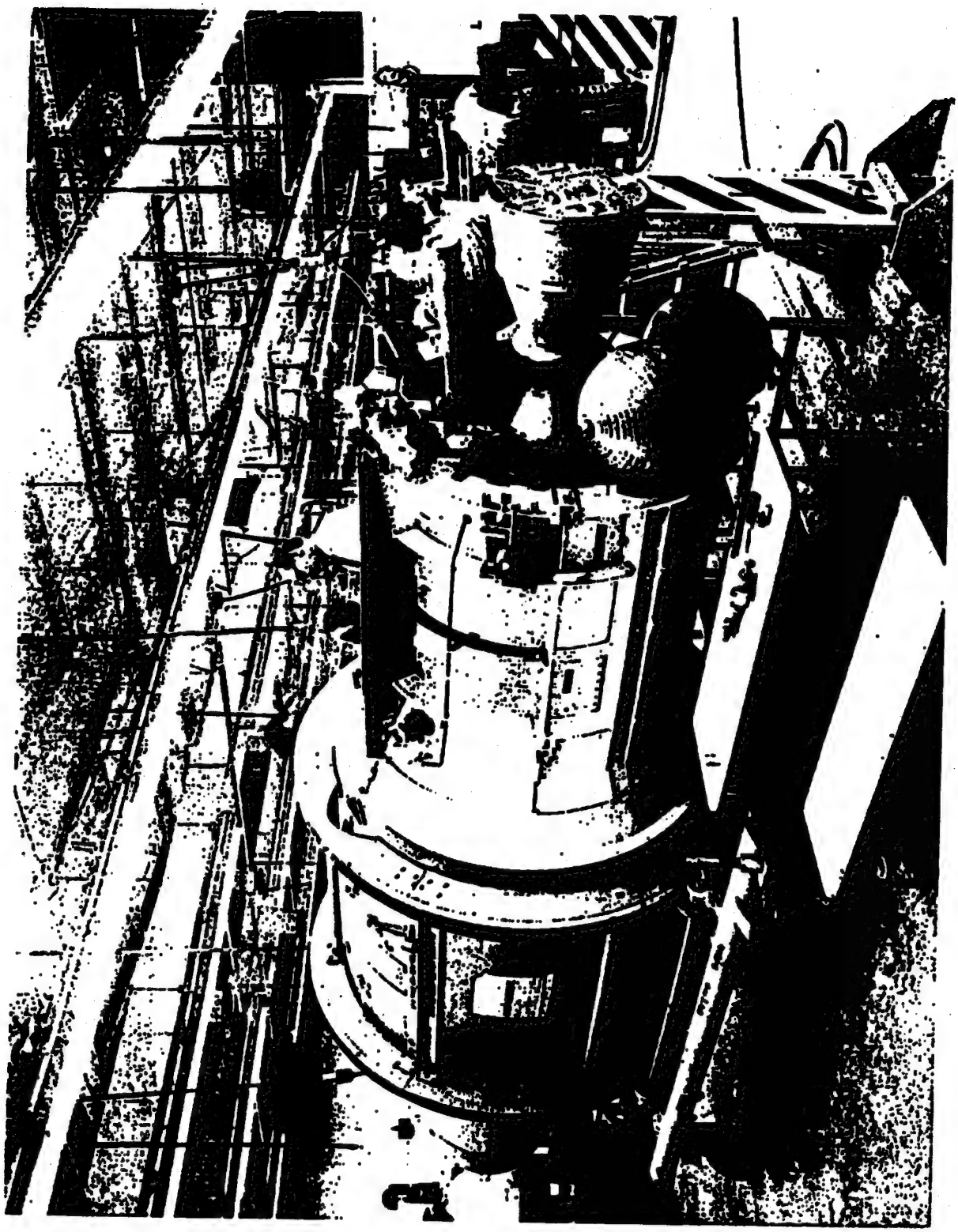

P 2022 FLIGHT TEST VEHICLE NO. 2 IN MOD & CHECKOUT - LMSD PALO ALTO

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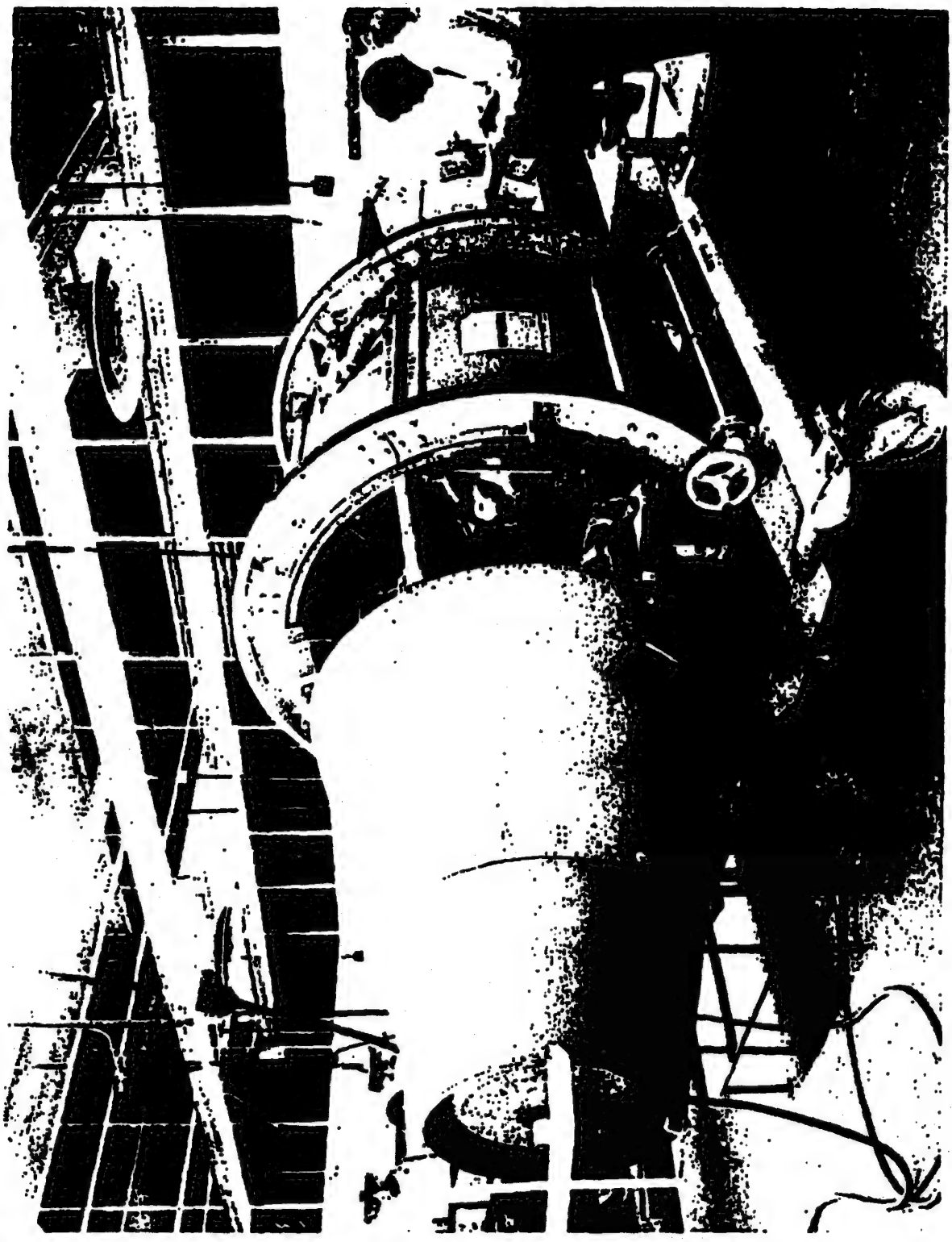

P 3021 FLIGHT TEST VEHICLE NO. 2 IN MOD 6 CHECKOUT - LMSD PALO ALTO

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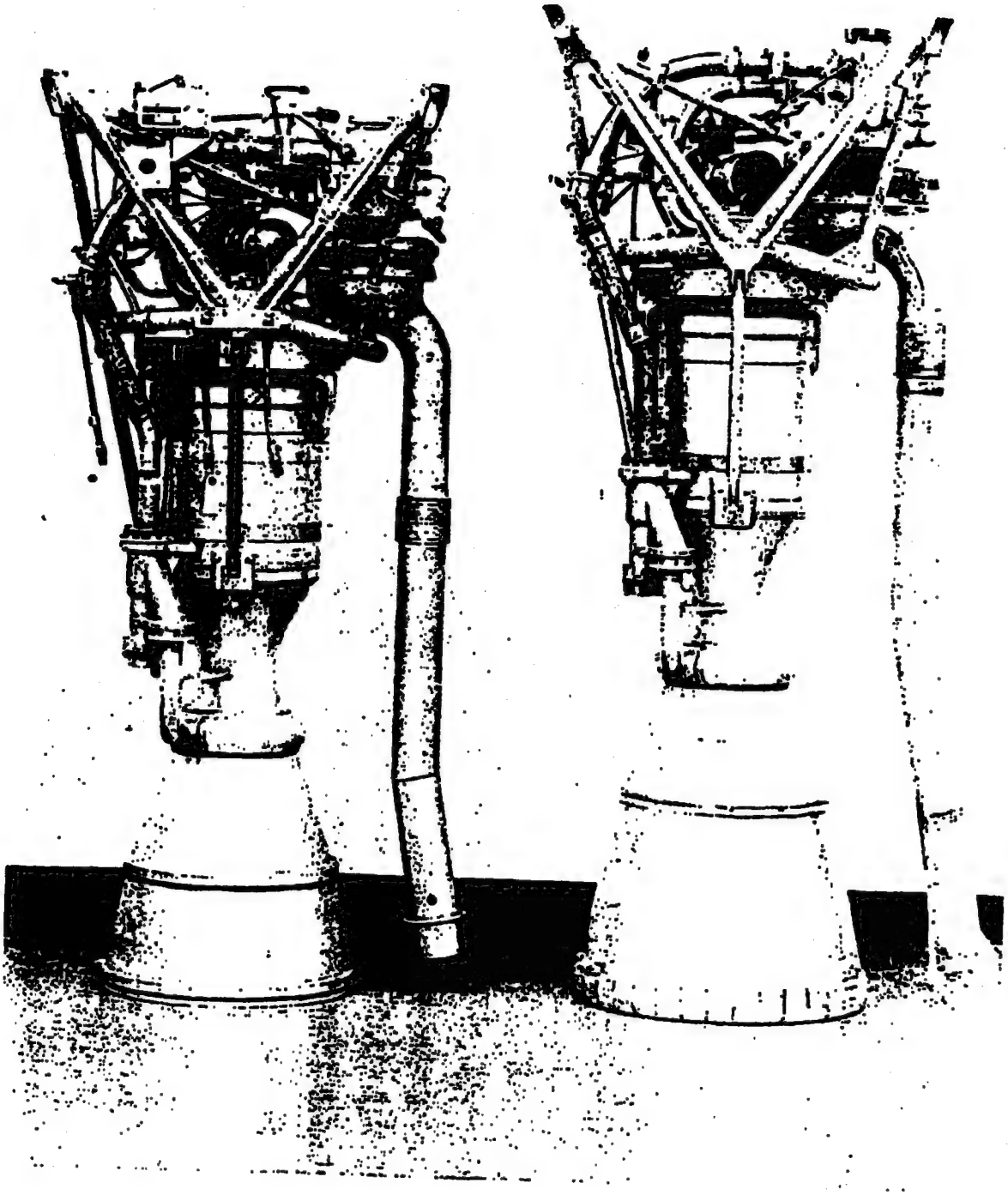

P 3039 MODEL XLR ENGINES - JP4 (LEFT) AND UDMH

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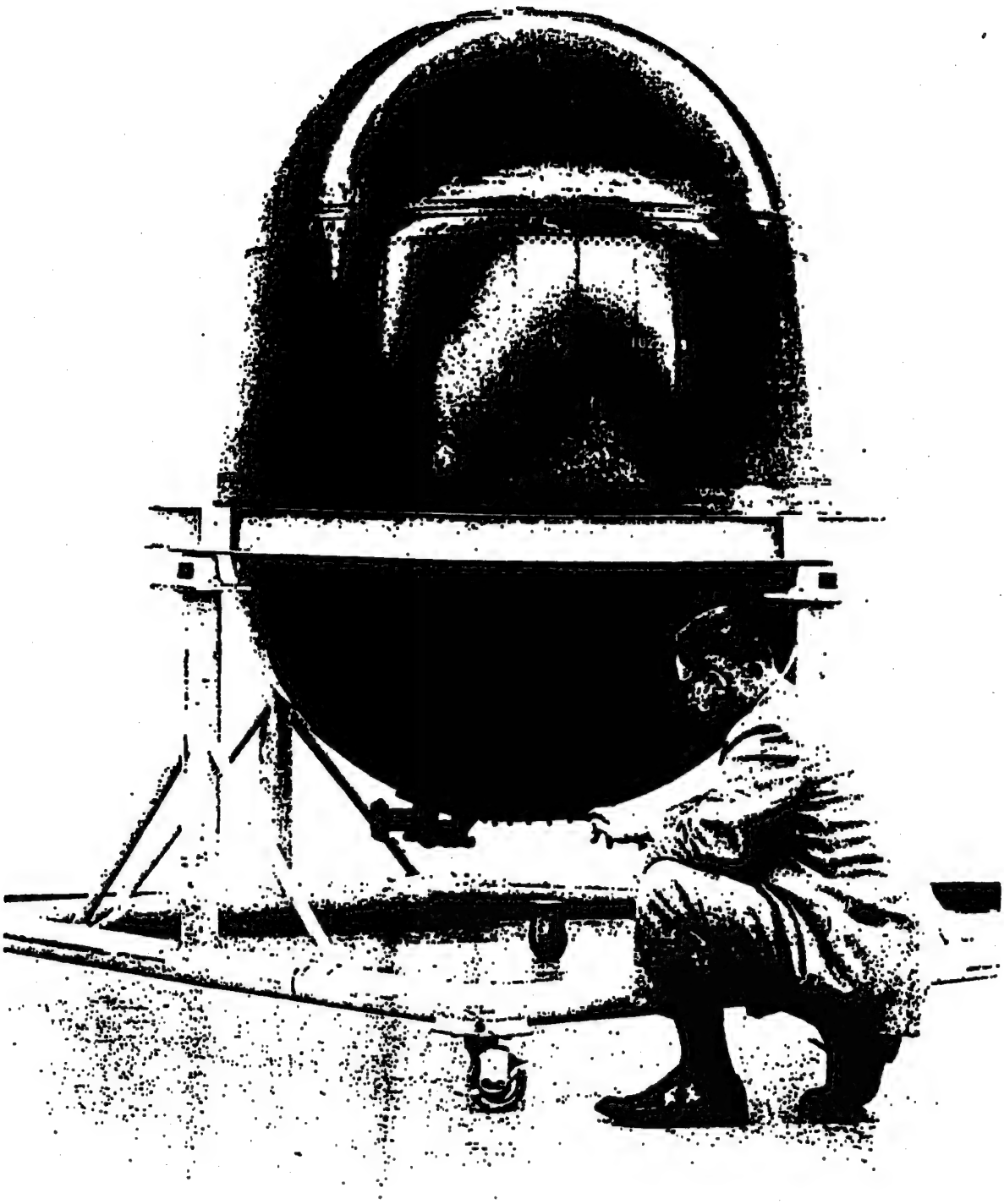

P3043 UDMH PROPELLANT TANK

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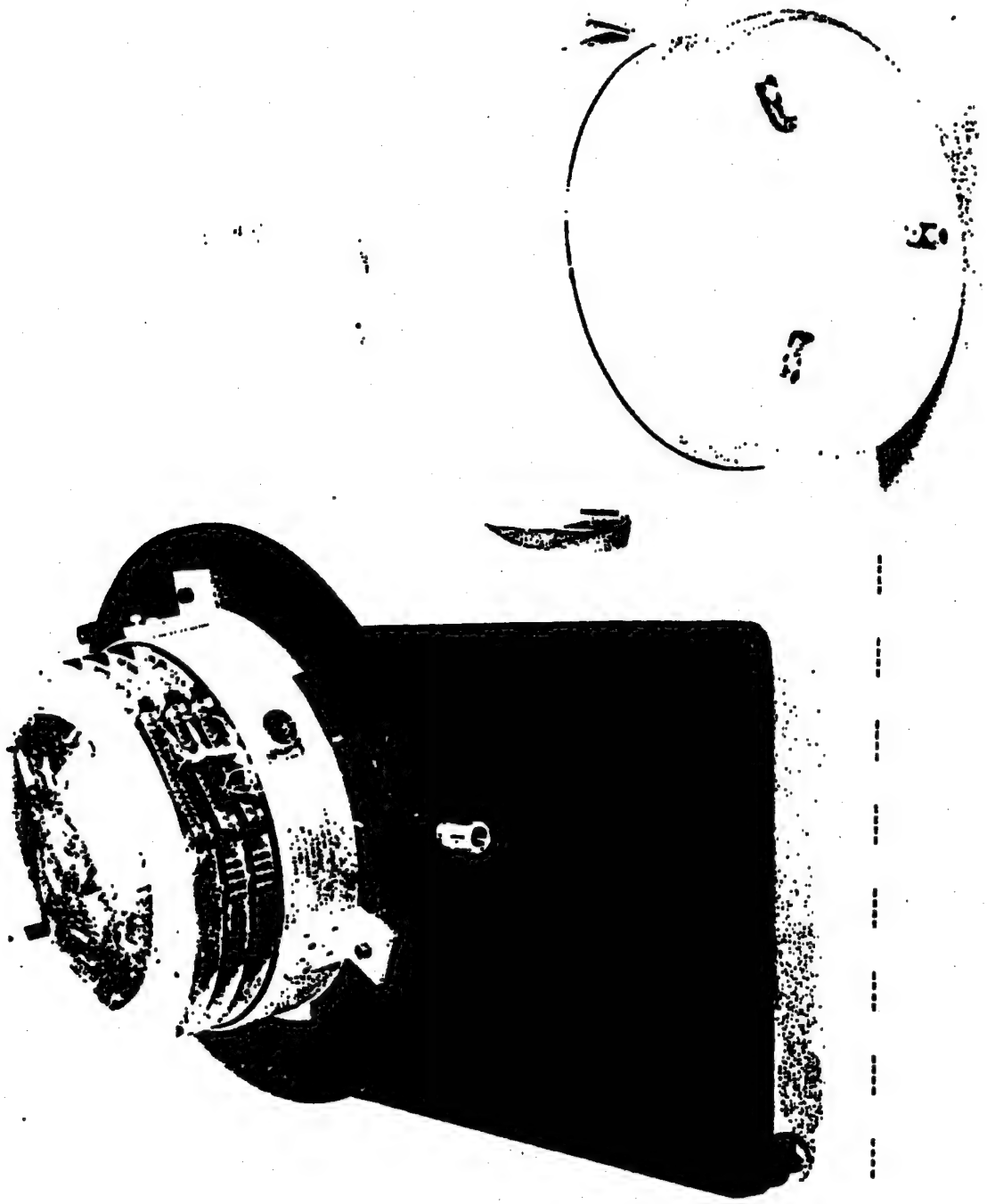

P2662 HORIZON SCANNER

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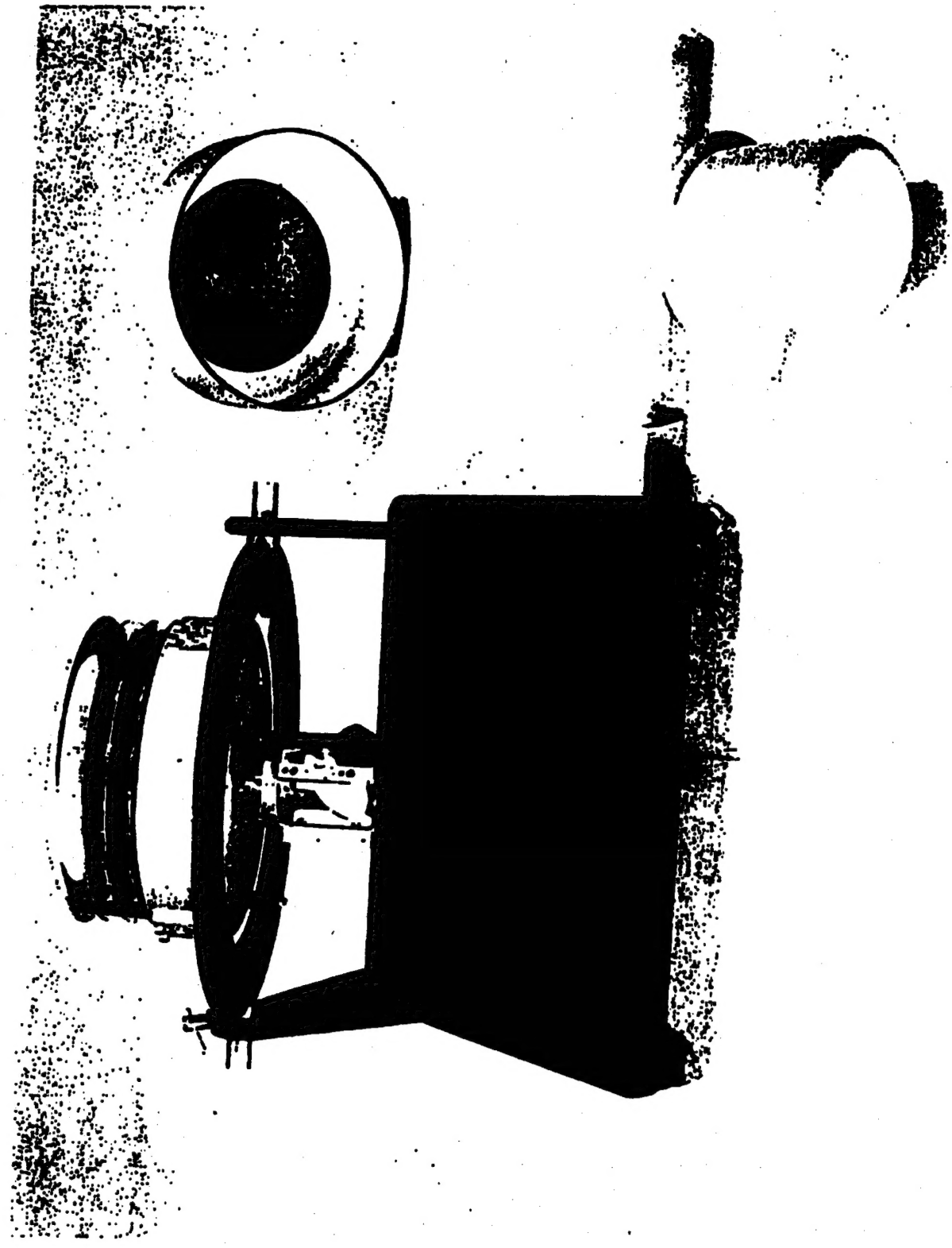

P2884 HORIZON SCANNER

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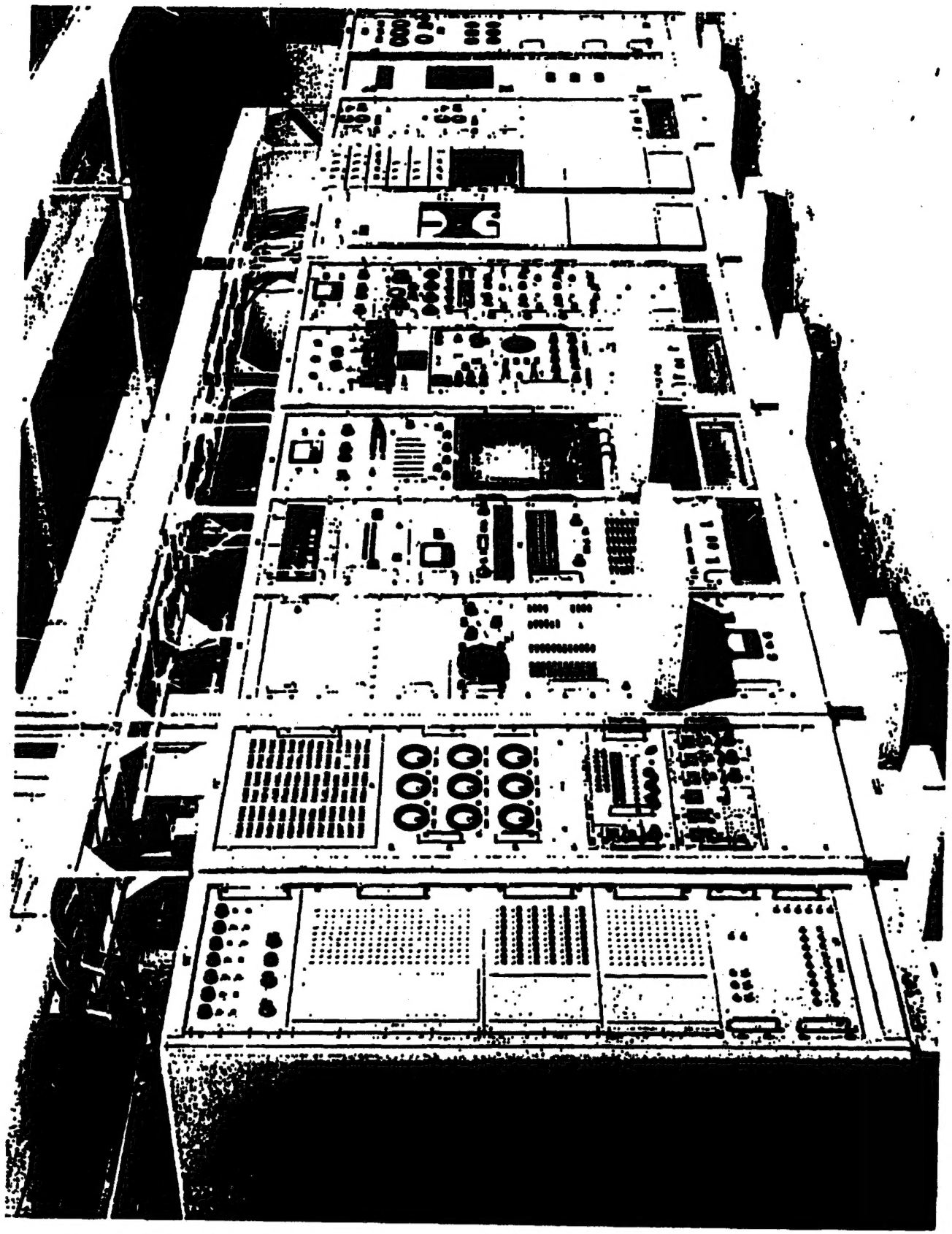
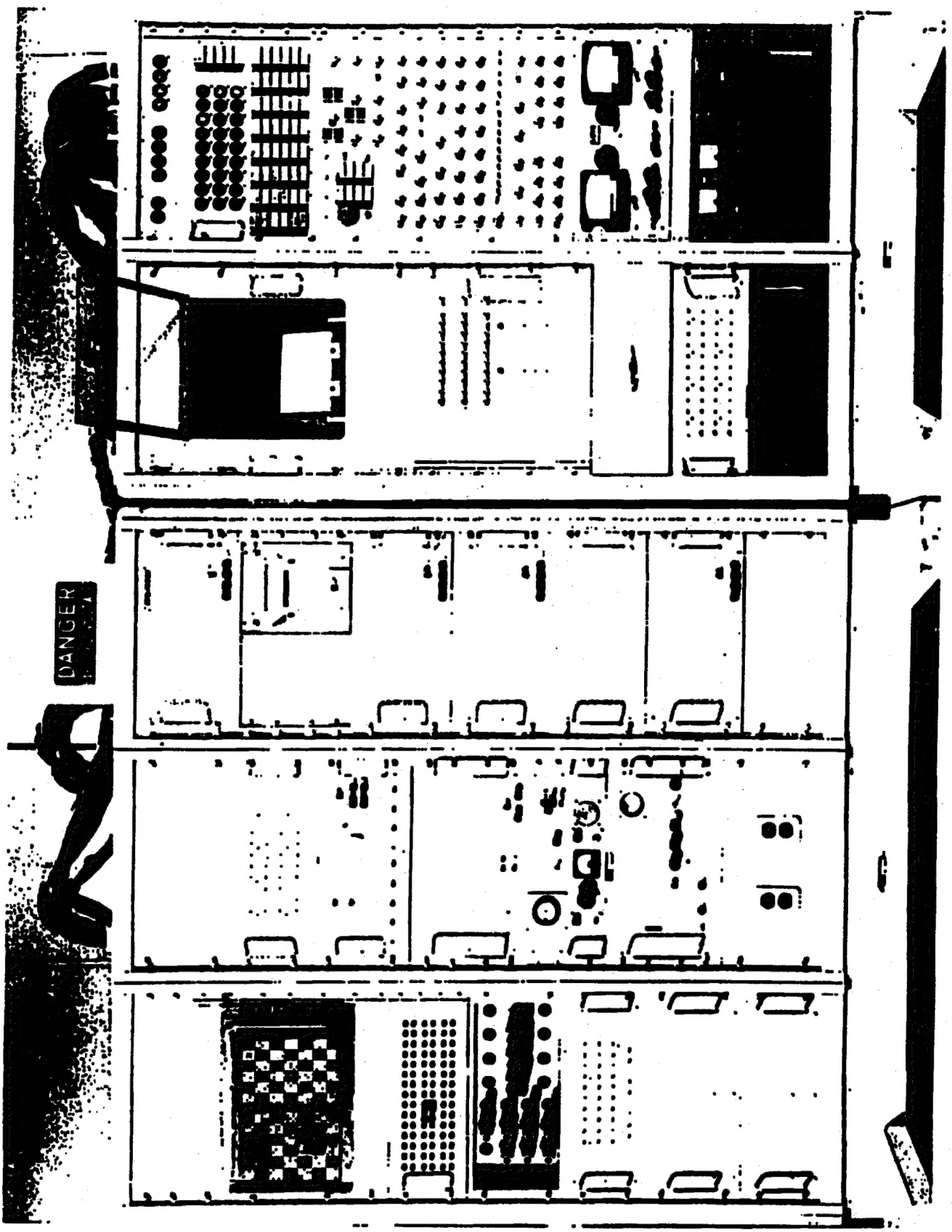


P-3046 SYSTEMS CHECKOUT COMPLEX (EXCLUDING LACE UNIT)



P3047 LACE UNIT (SYSTEMS CHECKOUT COMPLEX)